FEBRUARY 1960

ELECTRONIC PRODUCTS

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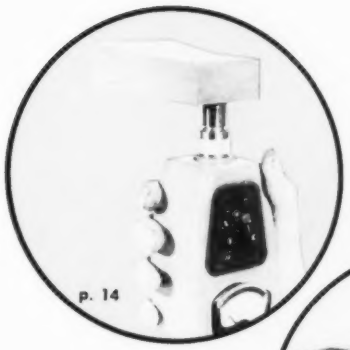
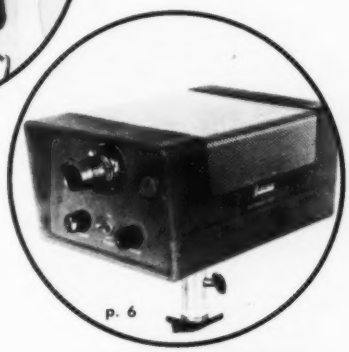
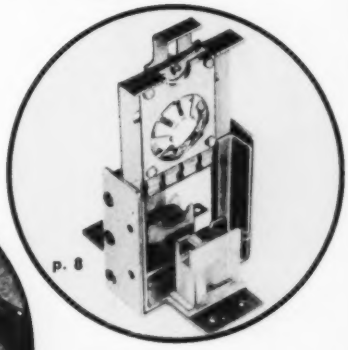
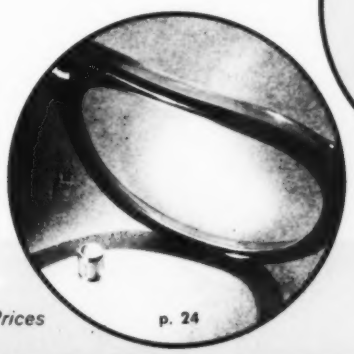
and **CLIP/FILE**









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FEATURING: *Specs* • *Applications* • *Availability* • *Prices*

eem File System Sec. 4000
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TRANSISTORIZED POWER SUPPLIES

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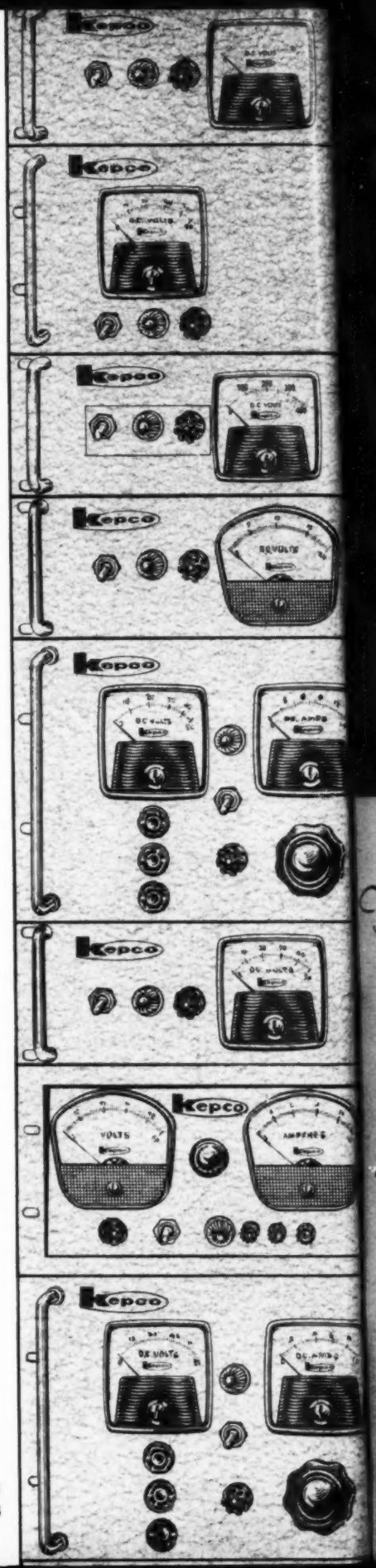
OVER 50 ACTIVE STANDARD MODELS

Solid achievement in solid-state design. Kepco's 14 years of specialized experience continues to set the standard for the "State of the Art" in voltage regulated power supplies.

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS.	REGULATION
SC-32-0.5	0-32	0-0.5	0.01%
SC-32-1	0-32	0-1	
SC-32-1.5	0-32	0-1.5	
2SC-32-1.5 Dual Output	0-32 0-32	0-1.5 0-1.5	
SC-32-2.5	0-32	0-2.5	
SC-32-5	0-32	0-5	
SC-32-10A	0-32	0-10	
SC-32-15A	0-32	0-15	
SC-60-2	0-60	0-2	
SC-60-5	0-60	0-5	
2SC-100-0.2 Dual Output	0-100 0-100	0-0.2 0-0.2	
SC-150-1	0-150	0-1	
SC-300-1	0-300	0-1	
SC-18-0.5	0-18	0-0.5	0.1%
SC-18-1	0-18	0-1	
SC-18-2	0-18	0-2	
SC-18-4	0-18	0-4	
SC-36-0.5	0-36	0-0.5	
SC-36-1	0-36	0-1	
SC-36-2	0-36	0-2	
SC-3672-0.5	36-72	0-0.5	
SC-3672-1	36-72	0-1	
PSC- 5-2	0-7.5	0-2	0.02%
PSC-10-2	7.5-12.5	0-2	
PSC-15-2	12.5-17.5	0-2	
PSC-20-2	17.5-22.5	0-2	
PSC-28-1	22.5-32.5	0-1	
PSC-38-1	32.5-42.5	0-1	
HB-2	0-325	0-200 ma.	0.1%
HB-4	0-325	0-400 ma.	
HB-6	0-325	0-600 ma.	
SR12-50	5-13	0-50	0.1%
SR28-50	24-32	0-50	
SR48-30	44-52	0-30	



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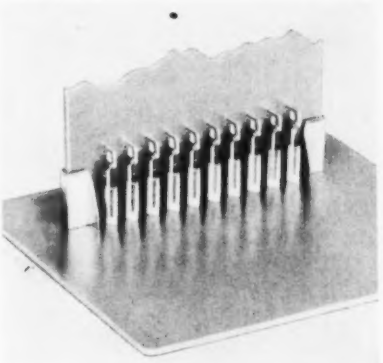
FEBRUARY 1960 • VOL. 1, NO. 2

SEC. 2100

SERIES 5000 BOARD-TO-BOARD PRINTED CIRCUIT CONNECTORS

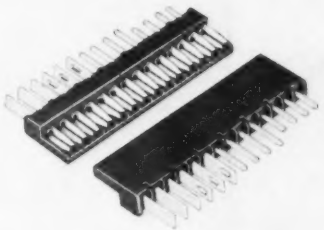


This new printed-circuit connector family gives the printed-circuit equipment designer the freedom to select any number of contacts; any spacing between contacts; any contact location pattern; any board material; and any angle of connecting two boards. Series 5201 illustrated here, is but one of many; and each employs our Varicon principle of forklike contact construction, with 4 mating coined surfaces—the industry's most reliable. Contacts are supplied on disposable plastic strips at .200" spacing; maximum of 61 on a single strip. Other spacing can also be provided. Mass production staking techniques may be accomplished with special tool available from Elco (per our Staking Bulletin). Unsurpassed rigidity and reliability result. For details and specs . . .

Write Elco Corp., Phila 24, Bulletin 108A

SEC. 2100

SERIES 8100 MICRO-MINIATURE VARICON CONNECTORS

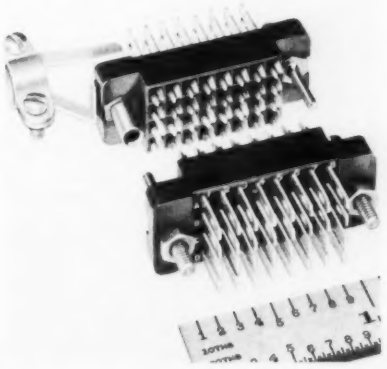


Again, Elco's established Varicon mating principle is applied in this series; only one of which—Series 8101—is here pictured. This series offers highest contact density and application–proved reliability. Series 8101 provides up to 14 contacts in one row at .100" spacing Series 8102 offers the same connector with brackets for printed circuit mounting applications with up to 12 contacts in one row at .100" spacing. Brackets for chassis mounting available, too. Series 8103 offers the same connector with 2, 3 or 4 tiers; with up to 14 contacts at .100" spacing per row, banded together at various positions. In Series 8103 adjacent tiers may be offset for .050" spacing. For summary of other advantages, details and specs . . .

Write Elco Corp., Phila 24, Bulletin 114

SEC. 2100

SERIES 8105 HIGH-DENSITY MICRO-MINIATURE VARICON RACK-AND-PANEL CONNECTORS



Varicon connectors assure users of this new series highest reliability and low contact resistance during the entire life of the equipment. Series 8105 is of hermaphroditic design, with mating insulators exactly alike except for contact numbering. Mating contact area extends 50% above insulator surface and 50% below it. Connector shown has 4 row of eight contacts; .100" spacing between contacts, .125" between rows. Other sizes also available upon order Contacts are identified on sight by letters for rows, numbers for columns. Various contact terminations can be selected. Connector can be equipped with cable clamp for side or top mounting. Each connector half is equipped with guide pin and guide socket. For complete details and specs . . .

Write Elco Corp., Phila 24, Bulletin 118

DIAMETER EQUALIZER [*Cinema Engineering, Div. Aerovox Corp.*]

eem File System electronic engineers master Sec. 1300

For Use With Quality 33-1/3 RPM Lateral Disc Recording

Effectively a dual equalizer, this new stereo unit provides automatic compensation for losses in high frequencies during disc recording due to reduced linear speed of the recording medium at the inner disc diameters.

High frequency losses are corrected continuously as the cutting head travels from the 12 inch diameter point to the 5 inch diameter point. The maximum equalization point provides 8 db equalization at 10 kc. The extreme operating points for the equalization range may be adjusted easily.

For right-hand operation type, the catalog number is 3991-S; and for left-hand operation, 3991-LS.

Dimensions are: 3⅜ inches diameter by 6¾ inches long. The mounting bracket extends 2 inches. The net weight is 2.5 pounds; the shipping weight is 4 pounds.

Impedance, 500-600 ohms (unbalanced); Input level, plus 24 dbm (maximum), minus 60 dbm (minimum); Insertion loss, 10 db.

PRICE: $152.00

AVAILABILITY: On request

MFR: Cinema Engineering, 1100 Chestnut Street, Dept. EP, Burbank, California

SALES OFFICES: See **eem** p. 1248 (1959-60 Ed.)

OTHER PRODUCTS: See **eem** pp. 1014, 1080

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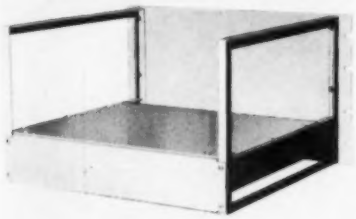
FLEXIBLE STEEL OR ALUMINUM CHASSIS [*Electro-Pack, Inc.*]

eem File System electronic engineers master Sec. 1400



Open Construction Above And Below Mounting Area For Maximum Circulation

These new Flexible Chassis provide maximum opportunity for cooling air to circulate, due to the open construction above and below the mounting area. Components are easily accessible from top, bottom, sides, and rear, with no sacrifice in chassis strength.

The units are ruggedly built, with side frames made of ⅛" thick prime aluminum extrusions, or .075 cold rolled steel, heli-arc welded for high rigidity.

Flexible chassis are 17" wide, plus O. Chassis lengths available from 9" to 26", in 1" increments. Front panels: any multiple of 1¾". Thickness of front panel is ⅛", with other thicknesses available. Mounting plate is .081 aluminum; rear panel is .081 aluminum, or .075 cold rolled steel on a steel chassis. Optional mounting plate heights range from 2⅝" to 10¾".

The center of any slide mounting 1" down from the side support will automatically align the chassis in accordance with EIA, Universal, or Western Electric hole patterns.

PRICE: $24.00 up **AVAILABILITY:** 2 weeks

MFR: Electro-Pack, Inc., 11505 Jefferson Blvd., Dept EP, Culver City, Calif.

OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem.**

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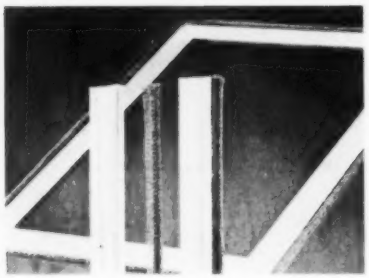
RF INTERFERENCE SHIELDING ASSEMBLY [*Technical Wire Products, Inc.*]

eem File System electronic engineers master Sec. 1400



Resilient Knitted Wire Strip Joined To Solid Aluminum Extrusion

Claimed to be the first new development in radio frequency interference shielding methods since the introduction of resilient knitted wire mesh, this Shielding Assembly called Tecknit RFI Teckstrip provides a new, compact, easy-to-install r-f interference shielding assembly.

A resilient, knitted wire strip, joined to a solid aluminum extrusion, is available in any specified length up to 30 feet with Tecknit RFL gasketing material in Monel, aluminum or silver-plated brass.

Teckstrip limits compression on the gasketing material because the extrusion can act as a stop. Installation time is also considerably reduced since only one component now need be mounted.

The rigid aluminum extrusion of Teckstrip adds to the structural strength of the box, maker says. The assembly is available pre-drilled or punched as required.

PRICE: Varies with requirements

AVAILABILITY: On request

MFR: Technical Wire Products, Inc., Dept EP, Springfield, N. J.

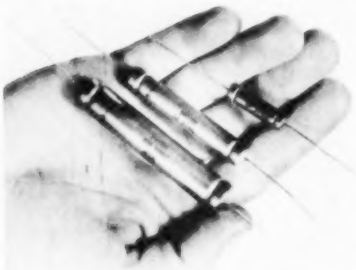
SALES OFFICES: See **eem** p. 1383 (1959-60 Ed.)

OTHER PRODUCTS: See **eem** pp. 478-479

Check 23 Reader Service Card 2/60

300 VOLT TANTALUM FOIL-TYPE ELECTROLYTICS [*General Electric Company*]

eem File System electronic engineers master Sec. 1500



Claimed To Be Smallest Of Kind In Production— 0.5 to 25.0 μf

These new Tantalytic (R) units available for operation at 85°C (to 300v) and 125°C (to 250v) are designed primarily for applications in missiles, computers and airborne electronic equipment. For their small size they supply higher volt-microfarad values than others presently available and are more economical than series-connected units of lower voltage rating, maker says.

Improved electrical characteristics are claimed for the units. A capacitance change of no more than 10% is specified after 2,000 hours operation at rated voltage and temperature. At −55°C the maximum capacitance change is 20%. Capacitance tolerances are tightened to ±15% compared to the ±20% or −15 +75% now standard with lower voltage units.

Available in seven case sizes in both polar and non-polar construction, the capacitors are supplied in tubular style with lightweight aluminum casing, insulation tubing and axial leads. Ratings range from 0.5 to 25.0 μf.

PRICE: From $4.10 to $23.39/unit (1,000 lot quant.)

AVAILABILITY: From stock

MFR: Gen. Electric Dept. EP, Schenectady 5, N. Y.

SALES OFFICES: See **eem** p. 1285 (1959-60 Ed.)

OTHER PRODUCTS: See **eem** pp. 494, 495, 683, 850, 851, 901, 1129

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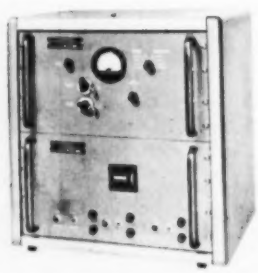
VHF FREQUENCY CONVERTER TRANSMITTER [*Control Electronics Company, Inc.*]

eem File System electronic engineers master Sec. 1900



For Use In F.A.A. Doppler VOR System

This new VHF frequency converter transmitter, covering the VOR band from 108 to 118 mc, will be used with the new F.A.A. Doppler VOR Navigational System. The frequency converter transmitter provides the 9.960 kc subcarrier frequency required for furnishing the reference data to the navigational system.

The transmitter, when furnished with an input signal of 1 watt in the 108 to 118 mc frequency range, delivers an output signal of 50 watts cw at a frequency 9.960 kc (±10 cps) higher than the original input frequency.

Spurious frequencies are virtually eliminated from the output, being supressed down to at least 60 db. This is made possible by unique design techniques utilized in the AFC system and the use of a fundamental frequency oscillator. Harmonic frequencies are also held down about 80 db by the use of a cavity-tuned final tank circuit and a four stage, low pass filter.

Line voltage is 115 or 230 volts at 55 to 65 cps. Over-all dimensions, including power supply case are: 24" high, 22" wide and 18" deep.

PRICE: On request

AVAILABILITY: 6-8 weeks

MFR: Control Electronics Company, Inc., 10 Stepar Place, Dept. EP, Huntington Station, N. Y.

SALES OFFICES: See **eem** p. 1254 (1959-60 Ed.)

OTHER PRODUCTS: See **eem** p. 539

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PRINTED IN U.S.A.

Vol. 2 No. 9 **February 1960**

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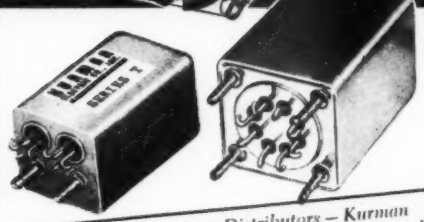

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VIDEO AMPLIFIER [*Interstate Electronics Corporation*]

eem File System Sec. 1900

Amplifies Low-Level Signals In 10 CPS To 10 MC Range

This new Model 1660 low-level Video Amplifier has been specifically designed to amplify low-level signals in the 10 cps to 10 mc range.

By use of a "T" connector at the input, the amplifier becomes a high-input impedance bridging amplifier for sampling and amplifying signals from a coaxial input. Typical uses include amplification of weak television signals and signal generator output signals, or bridging to remote monitors.

The Model 1660 is a small, portable, transistorized, non-inverting feedback amplifier, having self-contained batteries. An emitter-follower input circuit provides high-input impedance with a low-resistance, potentiometer-type gain control, providing variable gain to plus 20 db.

The technical specifications are: Voltage gain, 20 db (10X); Maximum input voltage without overload, 0.5 volt rms (1.5 volts peak-to-peak video); Maximum undistorted output, 1 volt rms, into 75-ohm load (3 volts peak-to-peak video); Amplitude distortion, less than 5 percent; Input noise level, less than 5 microvolts rms.

PRICE: $129.00 **AVAILABILITY:** On request
MFR: Interstate Electronics Corporation, 707 East Vermont Avenue, Dept EP, Anaheim, Calif.
SALES OFFICES: See **eem** p. 1307 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 531

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AUDIO-VIDEO INTERCOM EQUIPMENT [*Interstate Electronics Corp.*]

eem File System Sec. 1900

Small Portable TV Camera With Sound Pickup Facilities

Designated as Model 1900 this new instrument is a small portable television camera to which has been added sound pickup facilities. The video and sound signals are made to modulate internally generated TV channel RF carrier signals, in such manner that the output signal is similar to that radiated from a TV station. The unit will therefore produce both picture and sound signals on any television receiver by merely tuning the receiver to the camera's TV channel number.

Scanning rates: 15,750 cps (approx.) horizontal; 60 cps synchronized to power line, vertical; random interlace. Bandwith: 4 mc video modulated picture carrier; 50 kc FM modulated sound carrier. Signal output; 100 millivolt picture and sound carrier signals, into 75 ohm load. Requires 10 FC light level for usable picture, 50 FC recommended. Operates on 117 VAC, 60 cps. Lens mount 16 mm standard type "C". Power switch, beam, and focus control on front panel. 12¾" long, (less lens), 8⅛" wide, 5⅝" high.

PRICE: $995.00
AVAILABILITY: 30 days
MFR: Interstate Electronics Corp., 707 E. Vermont Ave., Dept. EP, Anaheim, Calif.
SALES OFFICES: See **eem** p. 1307 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 531

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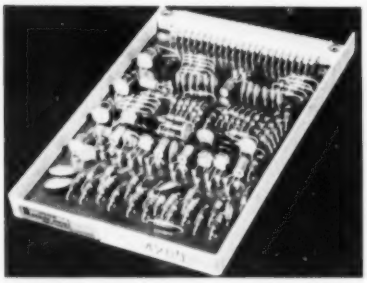
DUAL FLIP-FLOPS [*Digital Equipment Corporation*]

eem File System Sec. 2000



With Built-In Output Amplifiers—For Buffers, Control Registers, Etc.

A dual flip-flop package, containing two identical flip-flops with built-in output amplifiers, is featured in this new line of low-speed, low-cost System Building Blocks.

The Type 4209 Flip-Flop, which operates at speeds up to 500 kc, is one of eleven units in the new "4000 Series" System Building Blocks—compatible with the maker's 5 mc plug-in units. The unit is designed to provide economical flip-flops in buffer and control registers and other applications.

Each of the two flip-flops in the 4209 has a direct and gated input to the zero and one side, and each has one pulse gate internally connected to the gated one input terminal. The static-type flip-flops used in this unit have continuous d-c output signals, so actions need not occur at any fixed clock rate.

The eleven new units form a line of saturated transistor digital circuits operating at any speed up to 500 kc.

PRICE: From $43.00 to $89.00
AVAILABILITY: From stock
MFR: Digital Equipment Corporation, Dept. EP, Maynard, Mass.
SALES OFFICES: See **eem** p. 1262 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 542, 543.

Check 28 Reader Service Card 2/60

TRANSISTORIZED PUNCHED PAPER READER [*Digitronics Corp.*]

eem File System Sec. 2000

Reads 1000 Characters Per Second—Stops Before Next Character

This Model 3500 Photoelectric Reader is a completely solid-state unit which stops before the next character at reading speeds of 1000 characters per second. A unique design feature, essentially eliminating mechanical motion involved in tape stoppage, makes this fast stop possible.

Made to meet the requirements of accuracy, reliability and speed of digital computer input, machine tool control, or ground support equipment the reader handles all standard 5, 6, 7, or 8-level tapes plus sprocket interchangeably by simple tape guide setting.

Both dual and single speed units operating at 100 to 1500 characters/second are available. Silicon photo-diodes are used for stability over wide temperature ranges; light source is considerably derated for trouble free operation. Modular construction provides standard unit enabling user to specify only features required. Mounts on standard 19" rack.

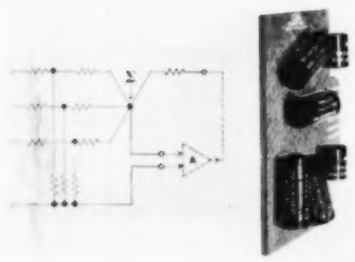
Illustrated below the reader is the new Model 4533 Spooler Unit which provides a take up reel for 300 feet minimum of paper or Mylar tape.

PRICE: On request **AVAILABILITY:** On request
MFR: Digitronics Corp., Dept EP, Albertson, N. Y.
SALES OFFICES: See **eem** p. 1262 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming 1960-61) edition of **eem.**

Check 29 Reader Service Card 2/60

OPERATIONAL AMPLIFIER NETWORK [*Julie Research Laboratories, Inc.*]

eem File System Sec. 2000



For A-C Or D-C Analog Operational Amplifiers

These Series NAC networks are designed specifically for a-c or d-c analog operational amplifiers in computers and high performance guidance systems, fire control equipment, and automatic-process controllers.

The networks are held to total summing accuracies as high as ± 0.005%, without trimming potentiometers or trimming capacitors.

The exceptional accuracy and stability specified for these networks are achieved by combining the primary-standard precision and stability of laboratory-style resistors, and the low inductance and capacitance of encapsulated resistors, in a unique geometry that minimizes distributed capacitance, inductance, and leakage resistance. Individual resistors are wound to tolerances as tight as ±0.003%, with stabilities of ±0.003% per year and time constants as low as 10^{-9} second. In terms of a computing amplifier operating at 400 cps, a series NAC network with as many as 10 inputs may be made with a total in-phase summing error of ±0.01% and a total quadrature error of ±0.02%.

PRICE: Depends on requirements
AVAILABILITY: 4-6 weeks
MFR: Julie Research Laboratories, Inc., 556 West 168 Street, Dept EP, New York 32, N. Y.
SALES OFFICES: See **eem** p. 1311 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 710, 711

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Author provides practical design problems and solutions that work!

DESIGN OF TRANSISTORIZED CIRCUITS FOR DIGITAL COMPUTERS

by Abraham I. Pressman, M.S.

This new book, by the well-known authority in the field of digital computer circuit design, was acclaimed by engineers attending the recent I.R.E. Show for its contribution to improved, miniaturized circuit design for digital computers. Any circuit design engineer can acquire a firm knowledge of the principles and practices of designing transistorized digital computer circuits from this new, authoritative text. The book is primarily concerned with design of computer building blocks using transistors. Particular stress has been placed on the most important building blocks . . . "And" gates, "Or" gates, Flip Flops, and interconnecting chains of such blocks.

To be of greatest general utility, the author employs "worst-case" design techniques. "Worst-Case" design is absolutely essential for digital type circuits, as these are of the nature of all or none circuits, and single errors even over long periods of time cannot be tolerated. His design considerations permit circuits to work when all supply voltages, resistors, passive components, and all transistor as well as diode parameters are simultaneously off their nominal values by the expected maximum tolerances.

Covers the major schemes currently employed in designing digital computer logic, including Pyramiding Factors, Turn On, Turn Off, and Storage Time calculations. Circuit analysis and all aspects of output waveforms are calculated treating the transistor as a current switch.

Circuit designers who have no background in transistors are provided with all the necessary transistor fundamentals as well as basic computer circuitry. Also contains a discussion of Boolean Algebra and its applications to the design of optimum switching circuits.

While this book is written from the viewpoint of the circuit designer, the method of analysis is easily followed by engineering students and technicians.

CONTENTS: Basic Building Blocks in Digital Computers . . . Logical Chains in Digital Computers . . . Transistor Fundamentals . . . Transistor Transient Response . . . Diode Gating . . . Voltage-Switching Diode Gate Logic with Transistor Inverting Amplifiers . . . Current-Switching Diode Gate Logic with Transistor Inverting Amplifiers . . . Resistance Logic with Transistor Inverting Amplifiers . . . Direct-Coupled Transistor Logic . . . Miscellaneous Transistorized Logic Circuits . . . Design of Flip-Flops and Delay Multivibrators . . . Appendix: Measurement of Transistor Turn-On, Turn-Off, and Storage Times. #215, cloth, $9.95.

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MASTER RECEIVING—PICTURE SUBSTITUTION GUIDEBOOK *by H. A. Middleton*

The popular Receiving Tube Substitution Guidebook* and all four supplements has been reset, expanded and brought up to date in one master book. The original Tube Substitution Guidebooks were considered the most handy and important work books for technicians, engineers and hobbyists —the new Master book is even more valuable. In one Master Book that is easy-to-use the entire range of all radio and television receiving and picture tubes and their substitutions are at your fingertips.

- 5100 Radio and Television Receiving Tube and 825 Picture Tube substitutions are listed in numerical sequence with accompanying wiring instructions showing the original and substitute tube socket illustrations. ● features European-American and American-European cross index listing 325 American to European substitutions; 320 European to American tube substitutions.
- special section on ruggedized tubes.

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by John F. Rider & Seymore Uslan

The second edition of the extremely useful book —has been expanded to include the new types of oscilliscopes and their applications. It is completely up-to-date!

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This 23 chapter (1300 pages) volume covers all construction and operating details of the tube-gun-deflection electrodes—screen; all the circuits used in oscilloscopes with explanations of circuit functions; specifications and schematics of American and foreign oscilloscopes; adjustment and application in all areas of use.

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It presents the conductance technique as applied to the design of a wide variety of vacuum tube and transistor amplifier, mixer, and oscillator circuitry in the broadest sense. #207, Cloth Bound. $9.95

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This manual, a companion volume to Conductance Design of Active Circuits, is the designer's tool complete with tube curves, tables, and explanations for applying the conductance approach to electronic circuit design problems. It will enable design engineers and lab technicians to select the proper tubes and their associated components to apply the conductance approach. It has been shown that the non-linear circuit may be linearized on a point-by-point basis if adequate data on the small signal characteristics of the non-linear devices are available. Based on this knowledge, the author has constructed more than 70 conductance curves representing more than 200 different vacuum tube types. #210, 128 pp., 8½ 11", spiral stiff cover binding. $4.25

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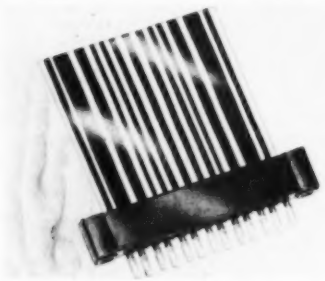
PRINTED CIRCUIT CONNECTORS [*Continental Connector Corp., Div. DeJur Amsco*]

eem File System electronic engineers master Sec. 2100



For Printed Tape Cable Or Printed Circuit Board Applications

Two series are included in this new group of miniature printed circuit connectors. They are designated as #600-4PCSC-13 for the 13-contact unit and #600-7-1 for the 18-contact unit. Both connectors have a current rating of 3 amperes and feature staggered placement of contacts to assure ease of wiring.

Molding is glass reinforced Diallyl Phthalate per Specification MIL-M-19833, Type GDI-30. Contact material is spring temper phosphor bronze, gold plate over silver plate. Contacts have a minimum spacing with maximum contact wiping surface.

Series 600-4PCSC-13 accepts 1/32-inch board or cable and can be stacked in any reasonable quantity because of module design of the molding. The solder lugs accommodate #22 AWG wire.

Series 600-7-1 is for 3/64-inch board or cable, Module design is not used in this series. The 18 contacts accommodate #24 AWG wire.

PRICE: On request
AVAILABILITY: On request
MFR: Continental Connector Corporation, Division DeJur Amsco, 34-63 56th Street, Dept. EP, Woodside 77, New York
SALES OFFICES: See **eem** p. 1253 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 563

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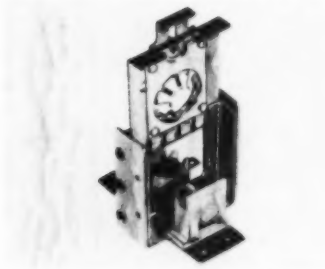
PLANAR TRIODE TUBE SOCKET [*Instruments For Industry, Inc.*]

eem File System electronic engineers master Sec. 2100



For General Electric GL6299 UHF Planar Triode

Practical UHF lumped constant circuitry with absolute assurance of bandpass stability as tubes are changed, is the purpose of this tube socket for the General Electric GL6299 UHF planar triode.

Designated as XV-100/6299, the rugged socket permits tube removal and replacement with absolute seating every time. Precise engineering and design techniques permit the miniaturized tube socket to be used to 1000 mc or higher with no resonances over the band.

Problems of poor grounding and high contact inductance which seriously limit upper operating frequency are eliminated, as well as the problem of varying circuit values resulting from shift of contacts, circuit parts, and poor seating.

Since the 6299 tube socket is primarily intended for grounded grid service, it provides a minimum of inductance for the grid return path to ground. The ground plane provides isolation between input and output for amplifier stability.

PRICE: $14.00 to $25.00 depending on quantity
AVAILABILITY: On request
MFR: Instruments For Industry, Inc., 101 New South Road, Dept EP, Hicksville, L. I., New York
SALES OFFICES: See **eem** p. 1306 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 450

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NON-REVERSING POWER CONNECTOR [*Specialty Electronics Development Corp.*]

eem File System electronic engineers master Sec. 2100

Both Plug And Socket—Mates Automatically For Communication, Power Circuits

This non-reversing hermaphrodite Power Connector is simultaneously male and female. This new device automatically mates with any other of its kind without regard to which end is which. It is both a plug and a socket at the same time. The unit is designed for military, telephone, telegraph, public utility circuits, as well as for factory and industrial use. It has a threaded collar lock which prevents accidental separation of joined units. Any connector can be plugged directly into any other without regard to sex, polarity or change in conductor path without the need of adapters or junction boxes.

Connectors have a power rating of up to 100 amperes, 440 volts AC, and are suitable for 2, 3, or 4 wire cables. Only one solder connection is needed for each conductor. Some features are: Built-in safety ground; Short circuit prevention; Recessed pins; Individual contact assemblies replaceable. Both cable and panel types available. Cable measures 2¾" in diameter. Housing is dull black, anodized aluminum. Weight is 1¼ pounds.

PRICE: Varies with requirements
AVAILABILITY: From stock
MFR: Specialty Electronics Development Corp., Dept EP, Syosset, N. Y.
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

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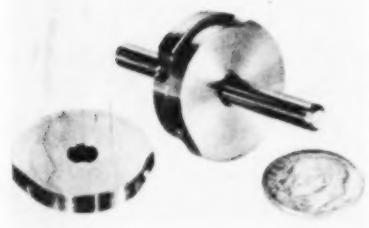
ADJUSTABLE INSTRUMENT CAM ASSEMBLIES [*Gap Instrument Corporation*]

eem File System electronic engineers master Sec. 2500



Space Saving — Features Dual Rise

Adjustable instrument cam assemblies that require less shaft space, yet provide two different rise rates on each cam, are the new units being produced by this manufacturer. The cam assembly design was prompted by "space shrinkage" needs of complex industrial and military servo systems produced by the maker's new "Servo Construction System".

An unusual feature of the new two-cam assembly is its ability to pair rises in three combinations: two sharp; two gradual; and one sharp and one gradual.

Two identical, stainless steel cams make up the 1/16-inch-thick assembly which has no mounting bushing; the cams are mountable directly and independently on a shaft. Each cam has two rises, a "sharp" and a "gradual", for maximum versatility, and is also adjustable from 180° to 360° "high" and 0° to 140° "low". Maximum radius of 0.500" and minimum radius of 7/16" permits 1/16" differential motion.

The dual cam assembly is furnished complete with Bristol or Allen #4 flat-tip set screws.

PRICE: $6.00 **AVAILABILITY:** On request
MFR: Gap Instrument Corporation, 116 East Merrick Road, Dept. EP, Freeport, L. I., New York
SALES OFFICES: See **eem** p. 1283 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 604, 605.

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DIRECT-READING GEAR TOOTH COUNTER [*PIC Design Corp.*]

eem File System electronic engineers master Sec. 2500

Checks Diametral Pitch, Number Of Teeth, Of Fine-Pitch Spur Gears

Developed for users of fine-pitch gears, particularly those who may stock various types of precision gears which may not be properly labeled or identifiable. Simple, direct operation provides the number of teeth, pitch and outside diameter. This new device eliminates laborious and time-consuming hand counting, as well as reducing the possibility of error.

In operation, the selected gear is first checked for pitch. If unknown, the gear is engaged with each of the test gears on the panel, until proper meshing indicates the correct pitch—48, 64, 78, 80, 96 or 120. The adjustable sine bar is set for indicated pitch by setting the pin on its free end into the proper pitch hole, thus forming an angle or wedge with the straight edge carrying the "Number of Teeth" scale.

The gear is slipped into the wedge area, shifted toward apex of wedge until gear binds, where vertical scale line to left and tangential to gear reads directly in terms of number of teeth. 11" x 5", complete with zipper carrying case.

PRICE: $19.95 **AVAILABILITY:** From stock
MFR: PIC Design Corp., 477 Atlantic Ave., Dept EP, East Rockaway, L. I., N. Y.
SALES OFFICES: See **eem** p. 1348 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 607

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GENERAL INSTRUMENT DISTRIBUTOR DIVISION

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1N270° 1N281

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1N276° 1N191 1N192

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1N68A	1N97A	1N117A
1N89	1N98A	1N118A
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1N95		1N198

° JAN types

They're designed for long life and extreme reliability—and manufactured under General Instrument's unique gold bonding process which assures dependable high forward conductance without sacrificing desirable low reverse leakage.

The listed diodes are only a fraction of the line; DR types as developed by General Instrument have in most cases characteristics far in excess of any of the standard types. We also make a full line of silicon diodes and rectifiers ranging from 50 ma to 35 amps...and all are available for immediate delivery.

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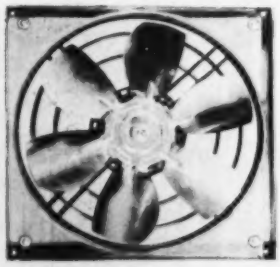
HIGH VOLUME FAN [*McLean Engineering Laboratories*]

eem File System electronic engineers master Sec. 2600



For Cooling Of Electrical Or Electronic Equipment

These new rugged propeller fans (Model 1PB95W) deliver 550 cubic feet per minute at a low decibel rating. They are panel mounted units for use in electronic racks, for mobile or stationary generators, military vans, or field vehicles carrying heat producing electrical or electronic equipment.

The fans are powered by a continuous duty, totally enclosed, 115 volts, 60 cycles per second, single phase, shaded pole motor, which meets Federal Specification CC-M-636A. Ball bearings meet Specification FF-B-171 and lubrication meets Specification MIL-G-3278, with a temperature range of —68°C to 93°C.

The motor has a stainless steel shaft, is corrosive resistant and fungus protected. The motor case is finned to give adequate cooling surface under 50 cps operation.

A heavy duty, two wire, 24 inch, rubber covered, SJ cord is supplied.

The propeller is a deep pitch blade, protected by a heavy nickel chrome guard. The motor and propeller are vibration isolated. All hardware is stainless steel or cadmium plated.

PRICE: $33.50 **AVAILABILITY:** From stock
MFR: McLean Engineering Laboratories, Dept EP, Princeton, New Jersey
SALES OFFICES: See **eem** p. 1325 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 611

Check 36 Reader Service Card 2/60

HERMETICALLY SEALED AUDIO FILTERS [*Control Electronics Company, Inc.*]

eem File System electronic engineers master Sec. 2700

Modular Units — For Multi-channel Band Separation Use

This modular line of audio filters for multi-channel band separation use has only recently been developed. Units have been made with center frequencies of 1.05, 3.78, 10.6, 21.6, 36.7, and 52.6 kc.

All the units in this series have input and output impedances of 2000 ohms, and have an insertion loss of less than 2 db. Dimensions of the units are 2¼ by 2⅛ by 4 inches high.

The Model BF-118 (illustrated) has a center frequency of 21.6 kc. Its 1.5 db bandwith is 13 kc and its 35 db bandwith is 34.5 kc, giving it a shape factor of 2.65.

The unit is packaged in a standard case and hermetically sealed to meet applicable MIL specifications.

PRICE: $85.00 (sample quantities)
AVAILABILITY: 3-4 weeks
MFR: Control Electronics Company, Inc., 10 Stepar Place, Dept. EP, Huntington Station, L. I., New York
SALES OFFICES: See **eem** p. 1254 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 539

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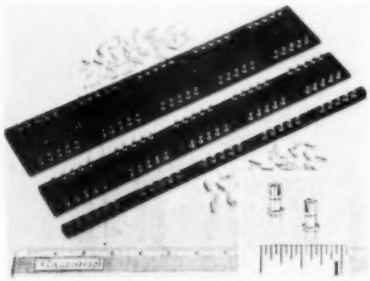
SCORED TERMINAL BOARDS [*Cambridge Thermionic Corporation*]

eem File System electronic engineers master Sec. 2800



In 5 Sections—For Breaking Into Convenient Lengths

The all-set terminal boards with Cambion(R) #1010 castellated terminals are now available in 13⅛ inch lengths, and widths of ½, 1½, 2, 2½, and 3 inches. Corresponding part numbers are: #1411, #1416, #1421, #1426, and #1431.

Three board materials are available: laminated phenolic per MIL P-15035B, laminated nylon phenolic per MIL P-15047B, and laminated thermosetting glass cloth per MIL P-18177B. Boards may be 1/32 or ⅛ inch thick.

The one-half-inch wide board has a single row of 25 #1010 terminals; all others, double rows of 25 terminals each. Terminals are mounted on ⅜ inch centers.

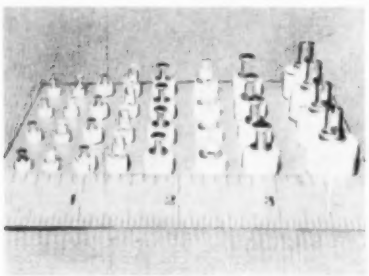
All boards are sectioned into five 2⅝ inch sections for convenient breaking into suitable lengths. Each section is drilled for 14 terminals, with 10 mounted. The hole size is 0.120 inch (#31 drill). Terminals are brass per QQ-B-626a, furnished in 6 shank lengths from 3/16 to 13/16 inch. Both boards and terminals are available in any quantity.

PRICE: $0.78 to $1.74 (1-9 pieces)
AVAILABILITY: From stock
MFR: Cambridge Thermionic Corporation, 445 Concord Avenue, Dept. EP, Cambridge 38, Mass.
SALES OFFICES: See **eem** p. 1244 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 519

Check 38 Reader Service Card 2/60

TEFLON TOP TERMINALS [*The Sphere Company, Inc.*]

eem File System electronic engineers master Sec. 2800



Outer Insulator Of Solid Teflon—Sizes From 11/64 To ½ Inch Diameter

The main feature of this new line is that the outer insulator is of solid Teflon(R). This material is machined to produce an insulator which possesses all the highly desirable characteristics for which Teflon is noted:

1) Extremely high dielectric strength, insulation resistance
2) Non-carbon tracking
3) High resistance to temperature extremes
4) Tough physical characteristics, abrasion and chemical resistance
5) Extremely low moisture absorption.

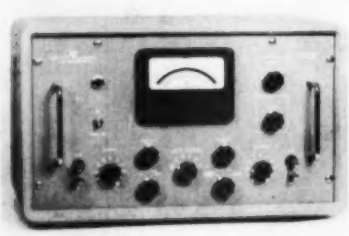
These terminals range in size from 11/64 to ½ inch in diameter. Larger and smaller diameters and heights are not available as stock items, but can be supplied on a special order basis. The terminals can be supplied in almost any standard head style: turret, slotted, double, and single lug. These terminals range in height from 13/64 to ¾ inch above the mounting panel. Assembly tools are available at less than $10 per set. The terminals are assembled by means of eyelet and rivet conductors.

PRICE: On request **AVAILABILITY:** From stock
MFR: The Sphere Company, Inc., 25 Amity Street, Dept EP, Little Falls, New Jersey
SALES OFFICES: See **eem** p. 1375 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 642

Check 39 Reader Service Card 2/60

PHASE ANGLE ANALYZER [*AD-YU Electronics Lab., Inc.*]

eem File System electronic engineers master Sec. 2900



Measures Small Angles (Fraction Of 1°) For Vector Relations, Phase Error

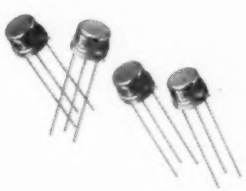
Maker claims new Vectorlyzer, Type 202, makes possible for the first time a number of measurements formerly impossible, or at best very difficult to accomplish—permits unusual speed and accuracy for measuring vector relations of alternating voltages. Measures very small phase angles (such as fraction of 1°) with a maximum error of less than 0.02° or 2%, and a sensitivity of 1° full scale. Measures low Power Factors and maybe modified to suit many special applications.

Manufacturer offers one week free trial on request. Some Specifications follow:

Accuracy: 0.02° or 2%, 0.005° deviations can be read
Full Scale Sensitivity: 1° or 0.04 Volt RMS
Frequency Range: 20 cps to 500 megacycles
Input Power: 60 watts at 115 volts rms ±10%, (230 volts available) 50/60 cycles.
Stability: Meter indication changes 0.1% or less, for 10% variation of line voltage.

PRICE: $538.00
AVAILABILITY: Delivery normally 1-2 weeks
MFR: AD-YU Electronics Lab., Inc., 249 Terhune Ave., Dept EP, Passaic, N. J.
SALES OFFICES: See **eem** p. 1217 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 535, 647

Check 40 Reader Service Card 2/60



specify with assurance when you specify

INDUSTRO

pnp alloy junction germanium COMPUTER transistors to MIL-T-19500A

- Medium to high speed switching
- Medium gain
- Tight parameters
- Very linear current amplification factor

TYPE	V_{CER} R_{BE}=5K volts	f_{ab} typ mc	h_{FE} typ I_C=−1 ma V_{CE}=−0.25V	h_{FE} typ I_B=−10 ma V_{CE}=−0.35V	Rsat (typ) I_B=−10 ma I_C=−100 to −200 ma ohms
2N425	−30	4	30	20	2.2
2N426	−25	6	40	25	2.2
2N427	−20	11	55	25	1.3
2N428	−15	17	80	35	1.1

- Medium gain, fast switching
- High reliability at maximum ratings
- Tight parameters
- Low leakage current at high temperatures

TYPE	V_{CER} R_{BE}=1K volts	f_{ab} typ mc	h_{FE} typ I_C=−10 ma V_{CE}=−1V	I_{CBO} max V_{CBO}=−20V μa	I_{EBO} max V_{EBO}=−10V μa	V_{CE}sat typ I_C=−10 ma volts @ I_B
2N1284	−20	8	90	−6	−6	−1.5 −.5 ma

Floating base replacement for 2N123

- General purpose HF switching
- Low leakage current at high temperatures
- Tight parameters
- High reliability at maximum ratings

TYPE	V_{CEX} V_{BE}=0.1V volts	f_{ab} typ mc	h_{fe} typ —	I_{CBO} max V_{CBO}=−12V μa	I_{EBO} max V_{EBO}=−12V μa	C_{ob} typ μμf
2N413	−25	2.5	30	−5	−5	12
2N414	−20	7	60	−5	−5	12
2N414B	−24*	7	60	−6 @ −20V	−5	12
2N416	−15	10	80	−5	−5	12
2N417	−12	20	140	−5	−5	12

*V_{BE}=0.2V

- High gain
- HF fast switching
- Low leakage current at high temperatures
- High reliability at maximum ratings

TYPE	V_{CEX} V_{BE}=0.25V volts	f_{ab} typ mc	h_{FE} typ I_C=−20 ma V_{CE}=−1V	I_{CBO} max V_{CBO}=−15V μa	I_{EBO} max V_{EBO}=−5V μa	V_{BE} max I_C=−20 ma V_{CE}=−1V
2N1344	−15	12	90	−10	−10	−.6V

- Medium to high gain
- HF switching
- Low leakage current at high temperatures
- Tight parameters
- Very linear current amplification factor

TYPE	V_{CER} R_{BE}=1K volts	f_{ab} typ mc	h_{FE} typ I_C=−10 ma V_{CE}=−1V	h_{FE} min I_C=−200 ma V_{CE}=−0.35V	V_{CE}sat typ I_C=−50 ma volts @ I_B
2N1353	−16	3.5	70	10	−0.1 −5 ma
2N1354	−20	4.5	70	10	−0.1 −5 ma
2N1355	−25	8	80	15	−0.08 −3.3 ma
2N1357	−20	12	85	20	−0.07 −2.5 ma

Floating base replacement for 2N394, 2N395, 2N396, 2N397

• Special selection to customer parameters • 100% test to all parameters • For critical military and industrial applications • JEDEC 30 (TO-5 case) packaged for automatic assembly

INDUSTRO

TRANSISTOR CORPORATION

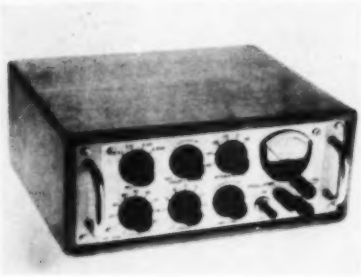
35-10 36th Avenue, Long Island City 6, N. Y. • EXeter 2-8000

IN CANADA: Canadian General Electric Co. Ltd.
EXPORT SALES: Roburn Agencies, Inc., 431 Greenwich St., New York 13, N. Y.

Check 6 Reader Service Card

LOW DISTORTION TRANSISTORIZED OSCILLATORS [*Burr-Brown Research Corp.*]

eem File System | Sec. 2900



Uses High Gain DC Operational Amplifier — Provides High Purity Sine Waves

These new battery powered compact oscillators of Modular Design offer a reliable, isolated source of High Purity Sine Waves, and have an output impedance of 600 ohms. Models 210A and 211A provide single-ended outputs, the 210B and 211B provide balanced outputs. For applications requiring a known output level, the 211A and 211B provide a calibrated output attenuator and level meter. In addition the maker says oscillators can be used for Amplifier Design, AC Bridge Supplies, Ground and Line Isolation, Floating Signal, Systems Testing, Linearity, and Distortion Measurement. Some Specifications follow:

Maximum Output ..... 5.0v rms (open-circuit)
2.5v rms (600 ohm load)
Distortion ..... Less than 0.1%, 20-20,000 cps at 1.0v into 600 ohm load
Less than 0.1% 20-5,000 cps at 2.5v into 600 ohm load
Freq. Range ..... 1-100,000 cps
Freq. Accuracy ..... 5% of indicated value

PRICE: From $345 to $445
AVAILABILITY: Stock to 60 days
MFR: Burr-Brown Research Corporation, Box 6444—Dept EP, Tucson, Arizona
SALES OFFICES: See **eem** p. 1242 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 662

Check 41 Reader Service Card 2/60

ONE MEGACYCLE FREQUENCY COUNTER [*Hewlett-Packard Company*]

eem File System | Sec. 2900

Automatically Measures Frequency And Random Events Per Unit Of Time

An electronic counter with a wide variety of laboratory and industrial uses, this new Model 521G automatically measures frequency and random events per unit of time, or with the manual gate feature totalizes electrical events. With transducers, the instrument also provides convenient measurements of such mechanical quantities as speed, rpm, rps, weight, pressure, temperature and acceleration.

Frequency range of the unit is 1 cps to 1.2 mc. Accuracy is ±1 count ± the accuracy of power line frequency—usually ±0.1%, (±0.01% with optional crystal time base installed).

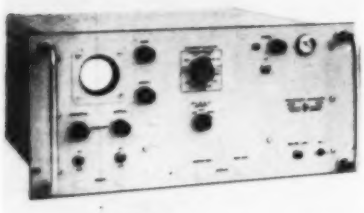
The Model 521G is an economical high frequency counter providing a five-place registration. Display time adjustable to approximately 15 seconds, or readings can be held until manually reset. The counter also has a front panel switch for convenient selection of automatic gate times of 0.1 or 1.0 second, or the manual gate. The counter features a self check to confirm accuracy of operation.

PRICE: $650.00 **AVAILABILITY:** 4 weeks
MFR: Hewlett-Packard Co., 275 Page Mill Rd., Dept EP, Palo Alto, Calif.
SALES OFFICES: See **eem** p. 1297 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 449, 688-693, 807-813, 905.

Check 42 Reader Service Card 2/60

FREQUENCY STANDARD [*Hewlett-Packard Company*]

eem File System | Sec. 2900



Stability of $5/10^8$ Parts Per Week And $3/10^8$ Over Short Intervals

This new unit is a compact, precision frequency standard, providing a stability of $5\ 10^8$ parts per week and $3\ 10^8$ over short intervals.

The Model 100ER standard, according to the manufacturer, not only provides exceptionally high stability, but offers a wide variety of output signals. Signals available include six sinusoidal frequencies (10 cps, 100 cps, 1 kc, 10 kc, 100 kc and 1 mc) and four pulse signals (10 cps, 100 cps, 1 kc and 10 kc). These may be distributed for use at many different stations on a production line or in the laboratory.

The frequency standard includes a timing comb for calibrating, and for measurement of sweeps and time intervals. It also has a built-in oscilloscope for Lissajous comparisons. The rated load of the instrument is 50 ohms at 1 mc and 100 kc, and 5,000 ohms at the lower frequencies.

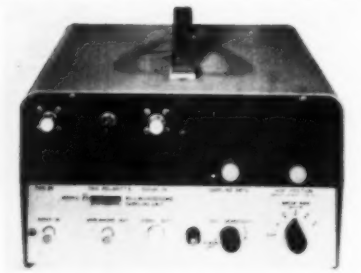
The unit is extremely compact: 8¾ inches high, 19 inches wide and 18 inches deep. Wt. 35 lbs.

PRICE: $900.00 **AVAILABILITY:** 10 weeks
MFR: Hewlett-Packard Company, 275 Page Mill Road, Dept EP, Palo Alto, California
SALES OFFICES: See **eem** p. 1297 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 449, 688-693, 807-813, 905

Check 43 Reader Service Card 2/60

UNIVERSAL MILLIMICROSECOND SAMPLING UNIT [*Lumatron Electronics, Inc.*]

eem File System | Sec. 2900



Used To View Millimicrosecond Pulses On Most Conventional Oscilloscopes

Model 22 Millimicrosecond Sampling Unit is a transistorized auxiliary instrument which makes it possible to view pulses having rise times of less than 0.5 millimicrosecond on conventional oscilloscopes having a band pass of only 500 kc.

Sweep speeds as low as 0.5 millimicrosecond per centimeter can be used, with excellent time stability. The Model 22ST triggers stably at repetition rates exceeding 300 mc. The unit has its own power supply and is therefore independent of the type of oscilloscope used.

Operation is simple; there are only four controls on the front panel of the unit. (Six controls on Model 22ST.)

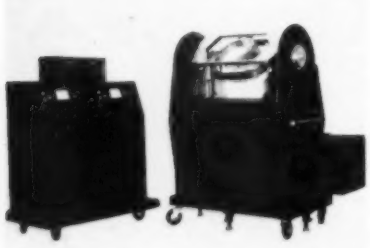
The instrument is packaged in a small, rugged cabinet, weighing approximately 12 pounds. A horizontal design permits the placement of the instrument on top of the slave oscilloscope and stacking of the Model 22 with other auxiliary units such as the separate Model ST-2 Synchronizing Trigger Unit and the PG-3 Pulse Generator.

PRICE: Model 22: $880.00 Model 22ST: $1260.00
AVAILABILITY: 60-90 days
MFR: Lumatron Electronics, Inc., 68 Urban Avenue, Dept EP, Westbury, L. I., New York
SALES OFFICES: See **eem** p. 1321 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

Check 44 Reader Service Card 2/60

FLIGHT SIMULATION TABLE [*Micro Gee Products, Inc.*]

eem File System | Sec. 2900



Enables "Flight Testing" Of Stabilization And Control Systems On The Ground

New Model 17A Two-Axis Flight Simulation Table enables "flight testing" of complete missile or airspace craft stabilization and control systems on the ground, as contrasted to such programs where gyro and accelerometer dynamics are linearily simulated. One of these new Model 17A Tables has just been placed in operation on the Pacific Missile Range.

The Model 17A two-degree-of-freedom table is also used for angularly displacing gyros and accelerometers, in pitch and roll, either statically or dynamically. The extremely smooth operation, due to specially designed, driven pendulum mechanisms, also enables use of the table as an oscillating table to determine the threshold characteristics of high performance gyros and accelerometers.

Features of the table include extended angular travel (over prior models) and the ability to handle a 25-pound load. The natural frequency of each axis is in excess of 15 cps. Adjustable damping is provided and the threshold of each axis is less than 0.005 degree.

PRICE: $33,000.00 **AVAILABILITY:** 30 days
MFR: Micro Gee Products, Inc., P.O. Box 1005, 6319 Slauson Avenue, Dept EP, Culver City, Calif.
OTHER PRODUCTS: See **eem** p. 792

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There's a representative stock of "Press-Fit" Teflon Terminals *stocked locally* for your convenience. They are immediately available in limited quantities. Packaged in sealed window envelopes with concise instructions. Also, matched insertion tools for proper installation.

For your prototypes... lab needs... special equipment... needed-in-a-hurry production requirements—take full advantage of that Sealectro distributor stock virtually at your finger-tips!

LITERATURE...

Latest "Press-Fit" catalog containing the outstanding selection of Teflon terminals, jacks, plugs and connectors, is yours for the asking.

*Reg. Trademark, E. I. DuPont de Nemours & Co., Inc.

Sealectro CORPORATION

139 HOYT STREET • MAMARONECK, N. Y.

Sealectro

PRESS-FIT® TEFLON TERMINALS

ARE AVAILABLE LOCALLY FOR IMMEDIATE DELIVERY FROM THESE STOCKING DISTRIBUTORS:

BALTIMORE, MD.—Kann-Ellert Elec., Inc.
9 South Howard St., SAratoga 7-4242

BATTLE CREEK, MICH.—Electronic Supply Corp.
94 Hamblin St., WOodward 2-9514

BOSTON, MASS.—Cramer Elec., Inc.
811 Boylston St., COpley 7-4700

CHICAGO, Ill.—Newark Elec. Company
223 W. Madison St., STate 2-2944

DALLAS, TEXAS—Wholesale Elec. Supply
2800 Ross Avenue, RIverside 8-5736

DAYTON, OHIO—Stotts Friedman Co.
102-112 N. Jefferson St., BAldwin 4-1111

HARRISBURG, PENNA.—D & H Distributing Co., Inc.
2535 North 7th St.

HOUSTON, TEXAS—Harrison Equip. Co., Inc.
PO Box 2514, 1422 San Jacinto St., CA 8-6315

INDIANAPOLIS, IND.—Radio Distr. Co.
1013 N. Capitol Ave., MElrose 5-8311

LOS ANGELES, CALIF.—Graybar Elec. Co.
210 Anderson St., ANgelus 3-7282

PHILADELPHIA, PA.—Harold H. Powell Co.
2102 Market St., LOcust 7-5285

SALT LAKE CITY, UTAH—Standard Supply Co.
225 East Sixth S. St., ELgin 5-2971

SAN JOSE, CALIF.—Peninsula Elec. Supply
656 South First St., CYpress 4-8781

SOUTH BEND, INDIANA—Radio Distributor Co.
1212 High St., ATlantic 8-4666

ST. LOUIS, MISSOURI—Electronic Components for Ind.
2427 Brentwood Blvd., WOodland 2-9917

TORONTO, CANADA—Electro Sonic Supply Co. Ltd.
543 Yonge St., WAlnut 4-9301

TULSA 19, OKLA.—Radio, Inc.
1000 South Main St., GIbson 7-9127

WASHINGTON, D.C.—Silberne Radio & Electronics Co.
3400 Georgia Ave., N.W., TUckerman 2-7800

MEASURING-CONTROLLER PANEL INSTRUMENT [*National Electronics*]

eem File System electronic engineers master Sec. 2900

No Physical Interaction Between Measuring And Controlling Functions

This new standard panel instrument houses a measuring instrument and a precision electronic controller.

The measuring instrument is available in moving coil and single, electrodynamic movements. Moving coil ranges are from 40 microamperes to 60 amperes and 10 millivolts to 600 volts. Single electro-dynamic movements have a normal current of 5 amperes and voltages of 110 volts, 220 volts, or 440 volts. Accuracy of all movements is 1.5%; 1% upon special request.

The controller consists of a blue (minimum) and a red (maximum) control marker. Attached to each marker is a photo resistance. A beam of light moves with the measuring pointer, and when the measuring pointer is lined up with a control marker, the beam of light enters the photo resistance window and activates a relay outside the instrument.

To provide broad application, three different switching assemblies are produced: holding-control assembly, automatic control assembly, and pulse-control assembly.

PRICE: Depends on type **AVAILABILITY:** 60-90 days
MFR: National Electronics, P.O. Box 1237, Dept EP, Sheridan, Wyoming
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

Check 46 Reader Service Card 2/60

DIGITAL VOLTMETER [*Non-Linear Systems, Inc.*]

eem File System electronic engineers master Sec. 2900

Low Cost—0.01 Percent Resolution

A new, low-cost digital voltmeter with full four-digit resolution is the Model V64, an addition to this manufacturer's line of digital instrumentation.

The Model V64 is designed for a wide range of DC measuring jobs and, with accessories, AC and low-level DC measurements. A precision instrument, the Model V64 features 0.01 percent resolution, high input impedance and an average measuring time of 0.75 second per reading.

A one-package instrument, the unit is 5¼ inches high by 15¼ inches deep for mounting in a standard 19-inch rack.

Its range without accessories is 500 volts DC in steps of ±9.999/99.99/500. The range can be increased by use of available accessories.

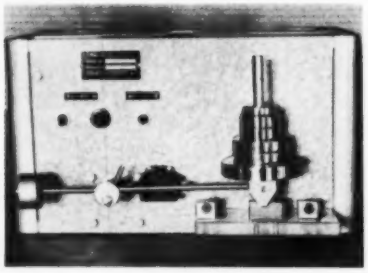
Its power requirements are 115 volts ±10%, 60 cps, 45 watts standby, 50 watts balancing. An export model will operate on 110 or 220 volts, 50 or 60 cps. Its net weight is 31 pounds; its shipping weight is 52 pounds.

PRICE: $825.00 **AVAILABILITY:** On request
MFR: Non-Linear Systems, Inc., Box 728, Dept EP, Del Mar Airport, California
SALES OFFICES: See **eem** p. 1338 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

Check 47 Reader Service Card 2/60

ABRASION-SCRAPE WIRE TESTER [*Peschel Electronics, Inc.*]

eem File System electronic engineers master Sec. 2900



Determines Abrasion Resistance Of Film-Insulated, High-Temperature, Magnet Wire

Abrasion-Scrape Tester Model TS-2 is a new device that repeatedly scrapes the wire with the cylindrical surface of a #11 steel needle, conforming to Navy Specification MIL-W-19583. The length of the scrape motion in one direction is ⅜ inch, and the distance from the scraper head to the eccentric driving mechanism is approximately 6 inches. The frequency of the scraper is 60 strokes per minute.

The device is equipped with an electrical circuit providing 12 volts at approximately 5 milliamperes between the needle and the wire sample. The electrical circuit is so designed that failure is detected and the device shut off when the film is worn through to the copper for approximately ⅓ of the stroke length. A mechanical counter indicates the number of strokes which were required to abrade the wire sample.

A complete set of precision ring-type weights of brass, chrome plated, is supplied to enable loading the scraper head with any value from 100 to 1200 grams.

PRICE: $550.00 **AVAILABILITY:** 4 weeks
MFR: Peschel Electronics, Inc., Dept. EP, Towners, RFD 1, Patterson, New York
SALES OFFICES: See **eem** p. 1346 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 742

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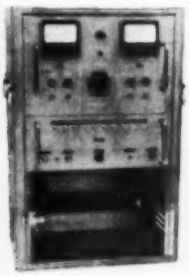
0-10 KV TEST SET WITH TEST CAGE [*Peschel Electronics, Inc.*]

eem File System electronic engineers master Sec. 2900



Semi-Automatic—For Testing A Group Of Components Or Multiconductor Cable

This new semi-automatic test set with test cage features integral construction for non-destructive hipot testing a group of components or multiconductor cable. The table top cabinet (illustrated) houses a 0-10 KV AC DC sensitive hipot tester, a central panel for control of the testing sequence, and a heavy lucite interlocked door leading to a large compartment for the group of components to be tested.

High voltage switching from one component to another is done within a small oil tank by special high voltage relays. The testing potential is continuously adjustable from zero to 10 KV; the electronic fault relay is adjustable in six steps from 5 to 5000 microamperes; dual scale panel meters show voltage and leakage current on each component being tested; and a guarded high voltage return is available in addition to a straight ground return.

Input is a standard lighting circuit of 115 volts, 60 cps, and the cabinet measures 22 inches wide by 36 inches high by 15 inches deep.

PRICE: $2,000.00 **AVAILABILITY:** 6 weeks
MFR: Peschel Electronics, Inc., Towners, RFD 1, Dept EP, Patterson, New York
SALES OFFICE: See **eem** p. 1346 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 742

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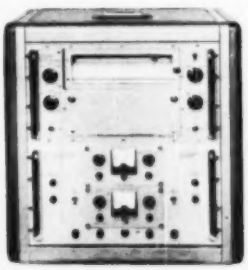
RECTANGULAR ANTENNA PATTERN RECORDERS [*Scientific-Atlanta, Inc.*]

eem File System electronic engineers master Sec. 2900



Writing Speed Better Than 40"/Sec—Also For Underwater Sound & Infrared Use

These APR-20 Series Antenna Pattern Recorders replace maker's Model 121A. The units include the addition of a db meter for signal level monitoring, built-in noise compression circuit for better signal to noise ratio, lighted chart compartment, automatic single chart advance. Other features are writing speed of better than 40"/sec and any or all combinations of log, linear, or square-root pen response obtainable with plug-in balance pots.

Three plug-in modules are offered, 1) a high gain, low noise bolometer-crystal amplifier with bolometer burnout protection, 2) a pen function amplifier and, 3) a pen balance potentiometer.

Features include: Overload indicator to prevent amplifier saturation; One electronics system drives both polar and rectangular recorder heads; Improved pen system; Chart scale expansion of 1:1, 6:1 and 36:1; 100 db gain in bolometer amplifier.

Optional extras include page size recordings, 60 db dynamic range system, d-c input preamp.

PRICE: $4100.00 to $5300.00
AVAILABILITY: On request
MFR: Scientific-Atlanta, Inc., 2162 Piedmont Road, N. E., Dept EP, Atlanta 9, Georgia
SALES OFFICES: See **eem** p. 1367 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

Check 50 Reader Service Card 2/60

THIS IS AN ENGINEERING SHEET
REMOVABLE FOR READY REFERENCE

eem File System | Sec. 1500

Schweber

BUYERS AND ENGINEERS

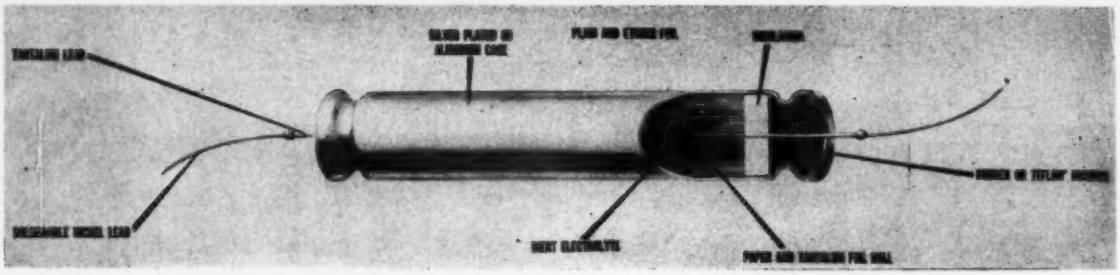
GUIDE TO

antalytic®

CAPACITORS

AND MICRO-MINIATURE RELAYS

Schweber ... 1ST FOR TANTALUMS



85°C TANTALYTIC® CAPACITORS BY MICROFARADS

LEGEND:

P = Polarized
NP = Non-polarized
PL = Plain Foil
E = Etched Foil

CASE SIZES:

B = 3/16" dia. x 11/16" long
C = 9/32" dia. x 7/8" long
D1 = 3/8" dia. x 1-7/16" long
D2 = 3/8" dia. x 2-1/8" long
D3 = 3/8" dia. x 2-3/4" long

TOLERANCES:

All Plain Foil = ±20%
ETCHED FOIL
0— 49 volts = —15 +75%
50— 99 volts = —15 +50%
100—150 volts = —15 +30%

MFD	WVDC	CAT. No.	DESC.
.1	150	29F461	NP-PL-B
.25	150	408	NP-PL-B
.4	100	595	NP-PL-B
.5	75	585	NP-PL-B
.5	150	600	P-P-B
.5	150	524	NP-E-B
.5	150	416	NP-PL-C
.8	50	575	NP-PL-B
.8	100	590	P-PL-B
1	75	580	P-PL-B
1	100	519	NP-E-B
1	150	401	NP-PL-C
1	150	402	P-PL-C
1	150	469	P-E-B
1.4	30	622	NP-PL-B
1.5	25	565	NP-PL-B
1.5	50	570	P-PL-B
1.5	75	503	NP-E-B
1.5	100	596	NP-PL-C
1.5	125	613	P-E-B
2	75	586	NP-PL-C
2	100	515	P-E-B
2	150	413	P-PL-C
2	150	470	NP-E-C
2	150	430	NP-PL-D1
2.5	15	557	NP-PL-B
2.5	30	617	P-PL-B
2.5	50	493	NP-E-B
2.5	150	407	NP-PL-D1
3	25	562	P-PL-B
3	50	576	NP-PL-C
3	75	498	P-E-B
3	100	591	P-PL-C
3.5	150	604	NP-PL-D1
4	10	547	NP-PL-B
4	60	403	P-PL-C
4	60	440	P-E-B
4	75	581	P-PL-C
4	100	520	NP-E-C
4	150	405	NP-PL-D2
4	150	429	P-PL-D1
4	150	447	P-E-C
4.5	15	552	P-PL-B
4.5	30	631	NP-E-B
4.5	50	473	P-E-B
5	25	489	NP-E-B
5	100	29F597	NP-PL-D1
5.5	30	623	NP-P-C
6	10	542	P-PL-B
6	25	566	NP-PL-C
6	50	571	P-PL-C
6	50	428	NP-PL-D1
6	75	504	NP-E-C
6	150	525	NP-E-D1
7	6	537	NP-PL-B
7	75	587	NP-PL-D1
7	150	601	P-PL-D1
7	150	605	NP-PL-D2
8	6	533	P-PL-B
8	30	434	P-PL-C
8	30	610	P-E-B
8	100	472	P-E-C
8	150	406	P-PL-D2
10	3.75	528	NP-PL-B
10	15	427	P-PL-C
10	15	510	NP-E-B
10	15	558	NP-PL-C
10	25	446	P-E-B
10	30	618	P-PL-C
10	50	494	NP-E-C
10	50	577	NP-PL-D1
10	100	592	P-PL-D1
10	100	598	NP-PL-D2
10	150	606	NP-PL-D3
12	25	563	P-PL-C
12	75	499	P-E-C
12	100	521	NP-E-D1
12	150	526	NP-E-D2
12	150	404	P-PL-D3
13	150	477	P-E-D1
14	75	582	P-PL-D1
14	75	588	NP-PL-D2
14	150	602	P-PL-D2
15	15	480	P-E-B
15	75	505	NP-E-D1
15	100	599	NP-PL-D3
16	10	548	NP-PL-C
18	15	553	P-PL-C
18	30	624	NP-PL-D1
18	30	632	NP-E-C
18	50	474	P-E-C
18	150	527	NP-E-D3
20	25	29F490	NP-E-C
20	25	567	NP-PL-D1
20	50	572	P-PL-D1
20	50	578	NP-PL-D2
20	75	589	NP-PL-D3
20	100	593	P-PL-D2
20	150	603	P-PL-D3
25	6	538	NP-PL-C
25	10	543	P-PL-C
25	30	432	P-E-C
25	100	516	P-E-D1
25	100	522	NP-E-D2
25	125	614	P-E-D1
25	150	478	P-E-D2
28	75	583	P-PL-D2
30	6	442	P-PL-C
30	30	619	P-PL-D1
30	50	495	NP-E-D1
30	50	579	NP-PL-D3
30	75	500	P-E-D1
30	100	594	P-PL-D3
32	30	627	P-E-C
35	15	559	NP-PL-D1
35	25	564	P-PL-D1
35	75	506	NP-E-D2
35	100	523	NP-E-D3
36	30	625	NP-PL-D2
36	50	424	P-PL-D3
36	150	479	P-E-D3
40	15	511	NP-E-C
40	25	485	P-E-C
40	25	568	NP-PL-D2
40	50	573	P-PL-D2
40	75	584	P-PL-D3
45	3.75	529	NP-PL-C
45	30	626	NP-PL-D3
50	25	445	P-PL-D2
50	50	444	P-E-D1
50	75	507	NP-E-D3
50	100	517	P-E-D2
55	10	549	NP-PL-D1
55	15	554	P-PL-D1
55	50	574	P-PL-D3
60	15	481	P-E-C
60	25	569	NP-PL-D3
60	30	620	P-PL-D2
60	30	29F633	NP-E-D1
60	50	475	P-E-D1
60	50	496	NP-E-D2
70	15	560	NP-PL-D2
70	25	467	P-PL-D2
70	25	491	NP-E-D1
70	75	501	P-E-D2
70	100	518	P-E-D3
80	10	544	P-PL-D1
80	50	497	NP-E-D3
85	6	539	NP-PL-D1
85	30	621	P-PL-D3
100	6	534	P-PL-D1
100	15	561	NP-PL-D3
100	25	468	P-PL-D3
100	50	410	P-E-D2
100	75	502	P-E-D3
110	10	550	NP-PL-D2
110	15	555	P-PL-D2
110	30	628	P-E-D1
120	30	634	NP-E-D2
125	15	512	NP-E-D1
125	25	486	P-E-D1
140	3.75	530	NP-PL-D1
140	25	492	NP-E-D2
150	10	551	NP-PL-D3
150	50	476	P-E-D3
160	10	545	P-PL-D2
160	15	556	P-PL-D3
170	30	635	NP-E-D3
175	6	540	NP-PL-D2
200	6	535	P-PL-D2
200	15	482	P-E-D1
200	25	612	NP-E-D3
220	10	546	P-PL-D3
220	30	629	P-E-D2
250	6	541	NP-PL-D3
250	15	513	NP-E-D2
250	25	487	P-E-D2
280	3.75	531	NP-PL-D2
300	6	536	P-PL-D3
300	30	630	P-E-D3
350	15	514	NP-E-D3
350	25	488	P-E-D3
400	3.75	532	NP-PL-D3
400	15	483	P-E-D2
580	15	484	P-E-D3

ALL THE ABOVE 85°C CYLINDRICAL TYPES CAN BE SUPPLIED WITH G4 SLEEVING

*125°C TANTALYTIC® CAPACITORS BY MICROFARADS

LEGEND:

P = Polarized
NP = Non-polarized
PL = Plain Foil
E = Etched Foil

CASE SIZES:

DB = 1/4" dia. x 1" long
DC = 11/32" dia. x 1-1/4" long
DD1 = 7/16" dia. x 1-15/16" long
DD2 = 7/16" dia. x 2-5/8" long
DD3 = 7/16" dia. x 3-1/4" long
1 = 3/4" x 3/4" x 1-1/8" high (Rect.)
2 = 3/4" x 3/4" x 7/8" high (Rect.)
3 = 3/4" x 3/4" x 1/2" high (Rect.)

TOLERANCES:

All Plain Foil = ±20%
ETCHED FOIL CYLINDRICAL
30- 65 volts = −15 +50%
70-100 volts = −15 +30%
RECTANGULAR and KSR −15 +75%

MFD	WVDC	CAT. No.	DESC.
.25	100	29F792	NP-PL-DB
.4	65	772	NP-PL-DB
.5	50	752	NP-PL-DB
.5	100	787	P-PL-DB
.5	100	1102	NP-E-DB
.8	30	732	NP-PL-DB
.8	65	767	P-PL-DB
1	50	747	P-PL-DB
1	65	782	NP-E-DB
1	100	793	NP-PL-DC
1	100	797	P-E-DB
1.5	15	722	NP-PL-DB
1.5	30	727	P-PL-DB
1.5	50	762	NP-E-DB
1.5	65	773	NP-PL-DC
2	50	753	NP-PL-DC
2	65	777	P-E-DB
2	100	788	P-PL-DC
2	100	1103	NP-E-DC
2.5	10	712	NP-PL-DB
2.5	30	742	NP-E-DB
3	15	717	P-PL-DB
3	30	733	NP-PL-DC
3	50	757	P-E-DB
3	65	768	P-PL-DC
3	100	951	NP-PL-3
3.5	100	794	NP-PL-DD1
4	50	748	P-PL-DC
4	65	783	NP-E-DC
4	75	945	NP-PL-3
4	100	798	P-E-DC
4.5	10	707	P-PL-DB
4.5	30	737	P-E-DB
5	65	774	NP-PL-DD1
6	15	723	NP-PL-DC
6	30	728	P-PL-DC
6	50	763	NP-E-DC
6	50	29F939	NP-PL-3
6	100	1104	NP-E-DD1
6	100	927	NP-E-3
6	100	948	P-PL-3
6	100	950	NP-PL-2
7	50	754	NP-PL-DD1
7	100	789	P-PL-DD1
7	100	795	NP-PL-DD2
8	65	778	P-E-DC
8	75	942	P-PL-3
8	75	944	NP-PL-2
9	75	921	NP-E-3
10	10	713	NP-PL-DC
10	30	734	NP-PL-DD1
10	30	743	NP-E-DC
10	30	933	NP-PL-3
10	65	769	P-PL-DD1
10	65	775	NP-PL-DD2
10	100	796	NP-PL-DD3
10	100	949	NP-PL-1
12	15	718	P-PL-DC
12	50	758	P-E-DC
12	50	936	P-PL-3
12	50	938	NP-PL-2
12	65	784	NP-E-DD1
12	100	1105	NP-E-DD2
12	100	924	P-E-3
12	100	926	NP-E-2
12	100	947	P-PL-2
13	100	799	P-E-DD1
14	50	749	P-PL-DD1
14	50	755	NP-PL-DD2
14	75	943	NP-PL-1
14	100	790	P-PL-DD2
15	50	764	NP-E-DD1
15	50	915	NP-E-3
15	65	776	NP-PL-DD3
16	75	29F941	P-PL-2
18	10	708	P-PL-DC
18	30	738	P-E-DC
18	75	918	P-E-3
18	75	920	NP-E-2
18	100	1106	NP-E-DD3
18	100	925	NP-E-1
20	15	724	NP-PL-DD1
20	30	729	P-PL-DD1
20	30	735	NP-PL-DD2
20	30	930	P-PL-3
20	30	932	NP-PL-2
20	50	756	NP-PL-DD3
20	50	937	NP-PL-1
20	65	770	P-PL-DD2
20	100	791	P-PL-DD3
20	100	946	P-PL-1
24	50	935	P-PL-2
24	100	923	P-E-2
25	65	779	P-E-DD1
25	65	785	NP-E-DD2
25	100	1100	P-E-DD2
27	75	940	P-PL-1
28	50	750	P-PL-DD2
30	30	736	NP-PL-DD3
30	30	744	NP-E-DD1
30	30	910	NP-E-3
30	50	759	P-E-DD1
30	50	904	NP-E-2
30	50	913	P-E-3
30	65	771	P-PL-DD3
30	75	919	NP-E-1
33	30	931	NP-PL-1
35	10	714	NP-PL-DD1
35	15	719	P-PL-DD1
35	50	765	NP-E-DD2
35	65	786	NP-E-DD3
36	75	29F917	P-E-2
36	100	1101	P-E-DD3
36	100	922	P-E-1
40	15	725	NP-PL-DD2
40	30	730	P-PL-DD2
40	30	929	P-PL-2
40	50	751	P-PL-DD3
40	50	934	P-PL-1
50	50	766	NP-E-DD3
50	50	914	NP-E-1
50	65	780	P-E-DD2
55	10	709	P-PL-DD1
55	30	731	P-PL-DD3
55	30	907	P-E-3
60	15	726	NP-PL-DD3
60	30	739	P-E-DD1
60	30	745	NP-E-DD2
60	30	909	NP-E-2
60	50	912	P-E-2
60	75	916	P-E-1
65	30	928	P-PL-1
70	10	715	NP-PL-DD2
70	15	720	P-PL-DD2
70	50	760	P-E-DD2
70	65	781	P-E-DD3
80	30	746	NP-E-DD3
100	10	716	NP-P-DD3
100	15	721	P-PL-DD3
100	30	740	P-E-DD2
100	30	908	NP-E-1
100	50	761	P-E-DD3
100	50	911	P-E-1
110	10	710	P-PL-DD2
110	30	906	P-E-2
150	30	741	P-E-DD3
160	10	711	P-PL-DD3
180	30	905	P-E-1

*When operated at an ambient temperature of 85°C the designated voltage of the 125°C types may be up-rated 50%
ALL THE ABOVE 125°C CYLINDRICAL TYPES CAN BE SUPPLIED WITH G2 SLEEVING

KING SIZE RECTANGULAR (KSR)® TANTALYTIC CAPACITORS BY MICROFARADS

CASE SIZES:

10 = 1.275" x .75" x 2.5" High
20 = 1.275" x .75" x 2.0" High
30 = 1.275" x .75" x 1.375" High

LEGEND:

P = Polarized
NP = Non-polarized
PL = Plain Foil
E = Etched Foil

MFD	VOLTAGE 125°C	VOLTAGE 85°C	Cat. No.	Desc.
20	100	150	29F1048	NP-PL-30
35	100	150	1024	NP-E-30
38	75	110	1088	NP-PL-30
40	100	150	1045	P-PL-30
40	100	150	1047	NP-PL-20
50	100	150	1046	NP-PL-10
55	50	75	1098	NP-PL-30
65	75	110	1087	NP-PL-20
70	100	150	1021	P-E-30
70	100	150	1023	NP-E-20
75	75	110	1040	NP-PL-10
75	75	110	1084	NP-E-30
75	75	110	1086	P-PL-30
78	20	30	1063	NP-PL-30
80	100	150	1044	P-PL-20
95	30	45	2009	NP-PL-30
100	50	75	1097	NP-PL-20
100	100	150	1043	P-PL-10
100	100	150	1022	NP-E-10
110	50	75	29F1098	P-PL-30
110	50	75	1034	NP-PL-10
130	75	110	1085	P-PL-20
140	50	75	1094	NP-E-30
140	75	110	1083	NP-E-20
140	100	150	1030	P-E-20
150	75	110	1037	P-PL-10
150	75	110	1081	P-E-30
156	20	30	1064	NP-PL-20
170	30	45	2007	P-PL-30
170	30	45	2008	NP-PL-20
175	30	45	1028	NP-PL-10
180	20	30	1065	P-PL-20
180	75	110	1082	NP-E-10
190	50	75	1095	P-PL-20
200	100	150	1091	P-E-10
210	10	15	1061	NP-PL-30
220	50	75	1031	P-PL-10
250	50	75	1092	NP-E-20
270	20	30	29F1066	NP-PL-10
270	75	110	1080	P-E-20
280	50	75	1091	P-E-30
300	30	45	2005	NP-E-30
300	30	45	2006	P-PL-20
330	10	15	1052	P-PL-30
340	50	75	1093	NP-E-10
350	30	45	1025	P-PL-10
350	75	110	1079	P-E-10
380	20	30	1067	P-PL-20
380	20	30	1068	NP-E-30
430	10	15	1053	NP-PL-20
480	30	45	2004	NP-E-20
480	50	75	1090	P-E-20
510	20	30	1069	P-PL-10
550	30	45	2002	P-E-30
606	10	15	1054	NP-PL-10
606	30	45	2003	NP-E-10
686	10	15	1055	P-PL-20
680	50	75	29F1089	P-E-10
720	20	30	1071	NP-E-20
750	10	15	1056	NP-E-30
750	20	30	2010	P-E-30
850	30	45	2001	P-E-20
960	10	15	1057	P-PL-10
1000	35	52	1000	P-E-10 *
1020	20	30	1072	NP-E-10
1100	30	45	1099	P-E-10
1320	20	30	1073	P-E-20
1400	10	15	2011	P-E-30
1400	25	37	1049	P-E-10 *
1500	10	15	1059	NP-E-20
1800	20	30	1074	P-E-10
2100	10	15	1060	NP-E-10
2200	15	22	1050	P-E-10 *
2400	10	15	1061	P-E-20
3500	10	15	1062	P-E-10

* Non-Standard Rating

Schweber ... 1ST FOR TANTALUMS

Schweber's Easy Guide To The Selection Of GE MICRO-MINIATURE RELAYS

In Five Short Steps . .

STEP	352791G2	X	X	X	X

1. PHYSICAL CONSTRUCTION:
Hermetically sealed, micro-miniature.
(This code always remains the same.)

2. ELECTRICAL CONSTRUCTION:
0 — Voltage calibrated, sensitivity 340 mw.
1 — Current calibrated, sensitivity 200 mw.

3. CONTACT ARRANGEMENT:
0 — Two-pole, double-throw.
1 — Single-pole, double-throw.

4. HEADER TYPE AND MOUNTING STYLE

A — Plug-in	Socket
B — Solder Hook	None
C — 3" Leads	None
D — Solder Hook	⅜" Studs, Top
E — Solder Hook	⅜" Studs, Side
F — Solder Hook	Bracket, Side
G — 3" Leads	⅜" Studs, Side
H — 3" Leads	Bracket, Side
J — Solder Hook	Bracket, Bottom
N — Solder Hook	¼" Studs, Top
R — Solder Hook	¼" Studs, Side
S — 3" Leads	¼" Studs, Side
V — Solder Hook	Bracket, Top
AJ — Plug-in	Bracket, Bottom

5a. COIL VOLTAGE (for voltage calibrated models only.)

2 — *5.2 volts
3 — 6.5
4 — 8.3
5 — 11.0
6 — 13.6
7 — 16.7
8 — 21.2
9 — 26.5
10 — 31.0
11 — 38.5
12 — 56
13 — 76
16 — 26.5

All Voltages Nominal.

For dry circuit processing

Suffix No. for Coil	Nominal Voltage	*Coil Res. @ 25 C	Factory Test and Inspection Values — (User Specifications Should Include Allowance for Motor Variations)				
			Model 3537910300 Series Two-pole Double-throw Contacts			Model 3537910301 Series Single-pole Double-throw Contacts	
			Max. Pickup Volts @ 25 C	Dropout Voltage Max.	Dropout Voltage Min.	Max. Pickup Volts @ 25 C	Dropout Voltage Max.	Dropout Voltage Min.
-2	5.2	77	3.80	1.97	.39	3.8	1.13	.26
-3	6.5	96	3.98	1.7	.34	3.71	1.4	.3
-4	8.3	123	4.3	2.14	.46	3.9	1.77	.38
-5	11.0	193	5.4	3.8	.8	4.3	3.3	.69
-6	13.6	196	6.9	3.28	.76	5.7	2.95	.63
-7	16.7	315	8.3	4.3	.92	6.9	3.5	.76
-8	21.2	349	10.4	5.4	1.19	8.6	4.45	.95
-9	26.5	549	13.3	8.48	1.8	11.3	5.75	1.24
-10	31.0	854	14.9	8.76	1.88	14.0	7.1	1.5
-11	38.5	1290	21.3	11.0	2.36	17.6	9.1	1.94
-12	56	2330	29.0	14.8	3.23	24.0	12.4	2.66
-13	76	3980	41.6	21.6	4.64	34.5	17.9	3.8
-01	26.5	1190	20.5	10.6	2.28	16.9	8.7	1.88
-02	38	1680	23.8	13.2	2.86	21.4	11.0	2.36
-03	66	3900	34	17.3	3.77	28.1	14.5	3.12
-04	90	5170	46	25.0	5.12	38.2	19.7	4.24

* These coils are being superseded by industry standardization on other wire sizes. Will continue to be available but at extra cost. Coils 11, 12, 13 and 16 are wound of two standard size wire and substantially duplicate the old coils.
* Coil resistance tolerance is ±10% except ±15% for -11, -12, -21, -22, -23, and ±20% for -12 and -24.

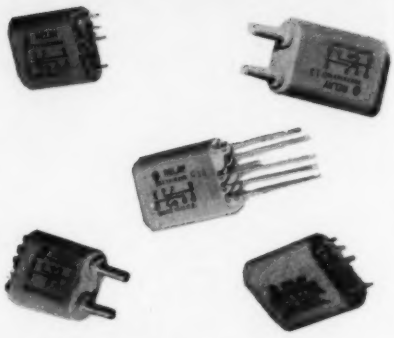
5b. COIL RESISTANCE (for current calibrated models only.)

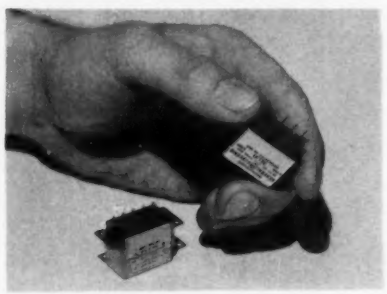
5 — *184 ohms
6 — 292
7 — 430
8 — 684
9 — 1104
10 — 1628
11 — 2556
12 — 5060
13 — 10000

*5 through 10 are ±10%; 11 and 12 are ±15%; 13 is ±20%.

Suffix No. for Coil	*Coil Res. @ 25 C	Factory Test and Inspection Values — (User Specifications Should Include Allowance for Motor Variations)				
		Model 3537910310 Two-pole Double-throw Contacts			Model 3537910311 Single-pole Double-throw Contacts	
		Max. Pickup Current @ 25 C (ma)	Dropout Current (ma) Max.	Dropout Current (ma) Min.	Max. Pickup Current @ 25 C (ma)	Dropout Current (ma) Max.	Dropout Current (ma) Min.
-5	184	33	16.7	3.33	16.7	12.8	2.96
-6	292	33.6	13.3	2.84	21.5	11.1	2.58
-7	430	40.8	11.5	2.21	17.5	9.06	1.96
-8	684	16.4	8.5	1.8	13.8	7.15	1.55
-9	1,104	12.2	6.84	1.46	11.1	5.72	1.25
-10	1,628	10	5.6	1.24	9.44	4.82	1.03
-11	2,556	8.8	4.56	.99	7.5	3.92	.840
-12	5,060	6.2	3.21	.69	5.2	2.69	.576
-13	10,000	4.6	2.35	.5	3.9	1.96	.42
-01	1,260	9.6	4.93	1.06	7.9	4.05	.87
-02	2,040	7.7	4.01	.86	6.3	3.29	.73
-03	3,900	6.3	3.29	.69	5.2	2.7	.58
-04	10,340	4.8	2.5	.54	4.1	2.1	.45

* These coils are being superseded by industry standardization on other wire sizes. Will continue to be available but at extra cost. Coils 19, 20, 21 and 22 are wound of wire standard size wire and substantially duplicate the old coils.
* Coil resistance tolerance is ±10%, except ±15% for -11, -12, -19, -20, -21 coils and ±20% for -12 and -22 coils.





NEW 4-Pole Micro-Miniature Suited For 160C Ambient

Provides four-pole configuration, exceptional long life performance—minimum of 10 million low-level operations, test units have run over 50 million operations. Suitable for continuous operation in a 160C ambient, the relay provides a valuable safety factor in application to 125C equipments. Vibration performance is excellent; it withstands 55 to 2000 cycles at 30G acceleration without contact opening. Operate power is only 400 mw.

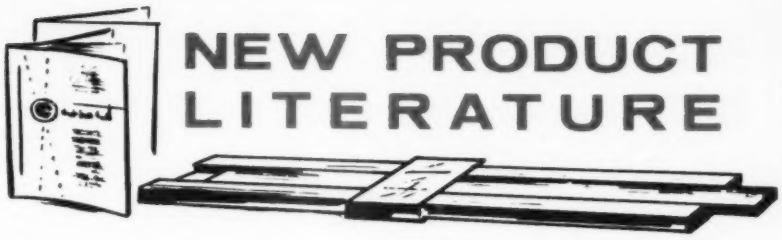
"THE Schweber POLICY"

1. To sell at Factory Prices.
2. To stock every type listed.
3. To ship moderate quantities from stock.
4. To maintain perpetual inventory so that material is always in stock, in transit or on order.
5. To give our customers honest and accurate delivery information based on factory acknowledgments.

DIRECT FACTORY SOURCE AT FACTORY PRICES

Schweber ELECTRONICS

60 HERRICKS ROAD, MINEOLA, L. I., N. Y. PIONEER 6-6520. TWX G-CY-NY-580U



NEW PRODUCT LITERATURE

SHIELDING DATA FILE — Sec. 1400

Comprehensive technical data and product information on RFI gasketing are now available in this handy, new RFI Designers Data File. Prepared to help designers solve specific shielding problems, this fully illustrated reference file offers both technical data and Practical information about RFI gasketing materials. **Technical Wire Products, Inc.**, 48 Brown Ave., Dept EP, Springfield, N. J.

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SUBMINIATURE CONNECTORS — Sec. 2100

Specifications, outline dimensions and general information on Series SM subminiature connectors are contained in this illustrated 12-page catalog, SM. These small, ruggedly constructed connectors are made to military approved specs in a variety of contact sizes. Electrical and mechanical ratings meet or exceed applicable paragraphs of MIL-C-5015 and MIL-C-8384. Electronic Sales Div., **DeJur-Amsco Corp.**, 45-01 Northern Blvd., Dept EP, Long Island City 1, N. Y.

Check 82 Reader Service Card

STEPPER DEVICES — Sec. 2200

Brochure SP9-1, a 12-page brochure, describes a new line of motors, rotary stepping switches, pulse dividers, precision sequences, counters, interval timers and positioning devices. Complete information is given including product features, application and construction details. Booklet also contains schematic drawings of the application circuitry as well as pulse profiles. **A. W. Haydon Co.**, 232 No. Elm St., Dept EP, Waterbury, Conn.

Check 83 Reader Service Card

CONTROL KNOBS, PANEL HARDWARE — Sec. 2400

In addition to control knobs, this two color catalog pictures knob locks, shaft locks, test jacks, subminiature fixed contact test jacks, subminiature snap-in contact test jacks, printed circuit test jacks, 5-way binding posts, fuse and resistor clips, terminal board brackets, captive hardware and pull handles. All items are pictured and shown in specification drawings with dimensions. W. H. Weed, Mechanical Components Dept, Industrial App. Div., **Raytheon Co.**, 100 River St., Dept EP, Waltham, Mass.

Check 84 Reader Service Card

MECHANICAL DIFFERENTIALS — Sec. 2500

This informative booklet illustrates the application of precision mechanical differentials, giving a few of the many possible and practical uses of instrument differentials. In simple, concise terms the booklet tells what mechanical differentials are, how they work, how they are constructed, etc. **PIC Design Corp.**, Div. Benrus Watch Co., 477 Atlantic Ave., Dept EP, East Rockaway, L. I., N. Y.

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TAPE WOUND CORES — Sec. 2500

Detailing the operating characteristics and typical circuit applications of Round and Square Hy Mu 80 (R) tape wound cores this booklet, titled "Hy Mu 80" has as its purpose the correction of instances of inadequate operation resulting from the selection, by some circuit designers of the wrong Hy Mu 80 for the application at hand.

Round and Square cores derive their names from the characteristic shapes of their hysteresis loops. A feature of this bulletin is a chronicle of tests in which each material was tested in a magnetic amplifier, a transformer, and a second harmonic modulator. Circuits and test results are plotted on curves. **Magnetics Inc.**, Dept EP, Butler, Penna.

Check 86 Reader Service Card

LABORATORY STANDARDS — Sec. 2900

Precision electrical instruments, renowned as lab standards serving the field of aircraft and missile development, the public utilities, and most standards laboratories, are described in this new color brochure, "World Standards". Published primarily for all those who recommend, specify and buy instruments of laboratory standard quality, there are details and diagrams of each major component, including construction and choice of special materials. Instruments described include d-c voltmeters and ammeters; a-c or a-c and d-c voltmeters, ammeters, and wattmeters; current transformers; and low voltage standardizing potential transformers and high voltage potential transformers. **Weston Instruments,** Div. Daystrom, Inc., 614 Frelinghuysen Ave., Dept EP, Newark 12, N. J.

Check 87 Reader Service Card

WAVEGUIDE DATA CHART — Sec. 3400

One of the most complete listings of waveguide information available, this Standard Waveguide Data Chart features military as well as EIA designation numbers. The chart shows virtually all required electrical as well as mechanical parameters for all waveguides in use today. Some parameters covered are: cut-off frequency, theoretical attenuation for both brass and aluminum waveguides, theorectical C.W. power rating, and the waveguide wavelength from the lowest to the highest frequency in any given band. Mechanical dimensions are also given for all waveguides, along with their tolerances. **Narda Microwave Corp.**, 118-160 Herricks Rd., Dept EP, Mineola, Long Island, N. Y.

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WAVEGUIDE WINDOWS — Sec. 3400

Electrical and mechanical data are listed for five types of ceramic, glass, or mica waveguide windows in this new catalog sheet. The windows are transparent to microwave signals from 8490 to 9578 Mc and remain vacuum-tight under pressure differentials up to 45 psi. **Sylvania Elec. Products Inc.**, Central Adv. Dist. Dept EP, 1100 Main St., Buffalo, N. Y.

Check 89 Reader Service Card

SYNCHRO & RESOLVER MANUAL — Sec. 3500

Detailed accounts of the application and measurement problems associated with synchros and control resolvers are presented in this new 25 page handbook. It covers such topics as What Is a Synchro, Application Problems, Electrical Zeroing Procedures, Null Measurement Procedures, Phase Shift and Transformation Ratio Procedures. **Theta Instrument Corp.**, 520 Victor St., Dept EP, Saddle Brook, N. J.

Check 90 Reader Service Card

ELECTRONIC WELDING EQUIPMENT — Sec. 4100

This new 4-page, short-form catalog, illustrates a newly completed line of precision electronic welding equipment. Contains descriptions, design and performance features, prices and illustrations of all Weldmatic stored-energy power supplies, column-mounted welding heads, and light to heavy duty handpieces. Several typical setups are shown to illustrate the versatility of the equipment. **Weldmatic,** Div. Unitek Corp., 380 No. Halstead Ave., Dept EP, Pasadena, Calif.

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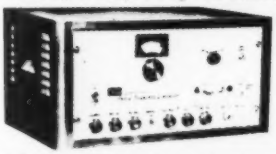
JERROLD

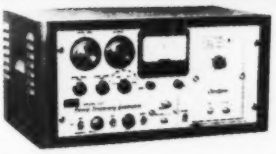
R. F. Test Equipment

Quantitative Measurements Using Sweep Frequency Techniques



Model 900A—THE MOST VERSATILE SWEEP GENERATOR $1,260.00

CENTER FREQUENCY—VHF 0.5 to 400 MC UHF 275 to 1000 MCS—**SWEEP WIDTH**—up to 400 MCS—**FLATNESS**—±0.5 db over widest sweep!



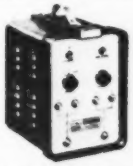
Model 707—ULTRA FLAT SWEEP GENERATOR $795.00

Featuring ±5/100 db *flatness*—Plug-in osc. heads*; variable sweep rates from 1/min. to 60/sec.; all electronic sweep fundamental frequencies; sweep width min. of 1% to 120% of C.F.

*Heads available within the spectrum 2 to 265 MCS

Models 601/602—PORTABLE GENERAL PURPOSE $295.00

COVERAGE—Model 601—12 to 220 MCS. Model 602—4 to 112 MCS—**FLATNESS** — ±0.5 db **OUTPUT**—up to 2.5 V RMS **WIDTH**-1% to 120% of C.F.



Model FD-30 $250.00

High speed DPDT coaxial switch permitting oscilloscope measurements without calibration—all measurements referenced continuously against standard attenuators.

Model AV-50

Variable Precision Attenuator $150.00

Long life rotary switches; dual wiping silver contacts on "Kel-F" dielectric. 0-62.5 db in ½ db steps; DC to 500 MCS.

Write for catalog and technical Newsletter series on measurements using sweep frequency techniques. Prices and data subject to change without notice.

JERROLD **ELECTRONICS CORPORATION**

Industrial Products Division Dept. ITE-2

The Jerrold Building, Philadelphia 32, Pa.

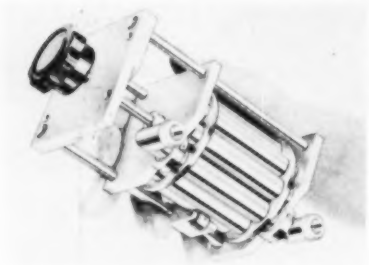
Jerrold Electronics (Canada) Ltd., Toronto

Export Representative: Rocke International, N.Y. 16, N.Y.

Check 8 Reader Service Card

10-POSITION TURRET ATTENUATOR [*Stoddart Aircraft Radio Co., Inc.*]

eem File System electronic engineers master Sec. 2900



Small Size—For Chassis Or Panel Mounting Accuracy Of ±0.5 db—DC To 3000 MC

This new 10-position Turret Precision Attenuator has frequency ranges of dc to 3000 mc on all values to 50 db, 1000 mc on values 51 db to 60 db. Any attenuation combination is available, including fractional values, from 0.1 to 60 db. Accuracy of ±0.5 db, rugged long-life construction, small overall size (approx. 2 1/16" x 2 7/8" x 7 1/4") are features of this device. Attenuation selection requires a "Pull-Turn-Push" sequence. Smooth, positive positioning is accomplished by a spring-load detent.

The turret attenuator is composed of nine resistive networks each arranged in a compact metal tube 3" long and 7/16" in diameter. A tenth tube provides a straight-through section for zero attenuation. These ten tubes are turret-mounted about a central shaft, which imparts radial and linear motion to the assembly. Some specifications follow:
Characteristic impedance: 50 ohms
Connectors: Type "N" coaxial fittings each end
Temperature Coefficient: .005 db per degree centigrade, based on calibration temperature of approximately 25°C
PRICE: $435.00 **AVAILABILITY:** 3 weeks
MFR: Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Dept EP, Hollywood 38, Calif.
SALES OFFICES: See **eem** p. 1378 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 751

Check 51 Reader Service Card 2/60

TRANSISTORIZED ELECTRONIC VOLTAGE SENSOR [*Tempo Instrument, Inc.*]

eem File System electronic engineers master Sec. 2900

Senses D-C Voltages—Also Comparator—Less Than 10 Milliseconds Response Time

Utilizing silicon transistors this new D-C Voltage Sensor is subminiature in size and weight. The device is fast-acting (less than 10 milliseconds response time) and extremely reliable.

The unknown voltage being sensed is compared to an internally-generated reference voltage. When the voltage exceeds the reference by a few millivolts the difference is amplified, fed to a trigger circuit, which energizes the output device. When used as a voltage comparator the user supplies a reference voltage in place of the internally generated reference voltage.

A model including a 2PDT crystal case relay output measures 1" x 1 9/16" x 3/4" and weighs less than 3 ounces. Solid state devices may replace the relay in the output circuit.

Models are available for sensing d-c voltages from 3 volts up with precisely calibrated, pre-set signal level marked on nameplates. Maker guarantees accuracy within ±5% of calibrated signal level under any combination of functional and environmental conditions.
PRICE: $240.00 **AVAILABILITY:** 4 weeks
MFR: Tempo Instrument, Inc., P.O. Box 338, Dept EP, Hicksville, N. Y.
SALES OFFICES: See **eem** p. 1385 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 1002, 1003

Check 52 Reader Service Card 2/60

ALL-EPOXY HEADER [*Epoxy Products, Inc.*]

eem File System electronic engineers master Sec. 3200

For Use With Either Epoxy Shells Or Conventional Metal Cases

An all-epoxy header, once available only as a part of its encapsulation system, is now being offered separately by this manufacturer.

Designed for use with either epoxy shells or conventional metal cases, the all-epoxy header could replace glass-to-metal hermetic seals in a wide variety of electronic applications. Since the header leads are embedded in cured, molded epoxy, there is no danger of cracked glass, no broken seals, and no coefficient of expansion problem during the soldering operation.

Several variations on the original header are available for different applications. In addition to conventional "straight through" leads, headers are available where the leads take a bend while passing through the body of the header. This enables the soldered ends of the lead to be in a different position on the header than the socket end of lead.

Dissimilar leads may be welded together and then molded into the body of the header for additional strength. Header leads are embedded to fit a standard seven-pin miniature socket.
PRICE: On request **AVAILABILITY:** On request
MFR: Epoxy Products, Inc., 137 Coit Street, Dept. EP, Irvington, New Jersey
SALES OFFICES: See **eem** p. 1275 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 784

Check 53 Reader Service Card 2/60

E-PLANE WAVEGUIDE SWITCHES [*DeMornay-Bonardi Corporation*]

eem File System electronic engineers master Sec. 3400

Transfer Connection Between Waveguides—For Direct or Remote Control

Two types of these new E-Plane Wave Guide Switches can be supplied. One is a 2-way exchange, which switches a common waveguide to either adjacent waveguide. Disconnected waveguide is terminated in a matched load. The second is a 4-way exchange, which switches two pairs of waveguides. The switches are for use in measurement set-ups, and in experimental and operational systems.

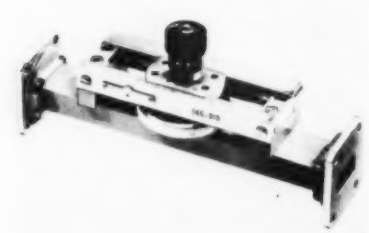
Each unit consists of a cylindrical housing, with waveguide flange connections brought out for the required positions. Switching is accomplished by a solenoid-operated rotor which connects any leg to either adjacent leg. Quarter-wave chokes provide continuity between stationary waveguide and rotor.

Units are designed for high capacity, and high channel separation. Remote indication or interlock of other functions can be controlled through two micro-switches which are in turn controlled by switch position. Remote control boxes available. Waveguide portion of switch supplied pressurized on request. Sizes range from 2.6 to 90 Kmc.
PRICE: $591.00 to $919.00 **AVAILABILITY:** 2 weeks
MFR: DeMornay-Bonardi, 780 S. Arroyo Parkway, Dept EP, Pasadena, Calif.
SALES OFFICES: See **eem** p. 1259 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 798, 799

Check 54 Reader Service Card 2/60

VARIABLE STUB TUNERS [*DeMornay-Bonardi Corporation*]

eem File System electronic engineers master Sec. 3400



For Precision Impedance Matching In Microwave And Ultramicrowave Systems

Designed to create impedance matches in both microwave and ultramicrowave systems with exceptional accuracy, this complete new line of precision variable stub tuners covers the frequency range from 2.6KMC to 90KMC.

Units in the range of 2.6 to 18KMC are equipped with calibrated position controls for both insertion and probe travel. A new scale and vernier provides precise resettability on longitudinal travel, and a new micrometer scale on the probe supplies instant accurate measurement of penetration. The probe is non-rotating, hence probe wobble is eliminated. The probe support has a dissipative insert which eliminates radiation effects. A VSWR as high as 20.1 can be tuned out with accuracy 1.02.

Units in the 18 to 90KMC range are engineered specifically for accuracy in these higher frequencies. All of the above features are available, plus micrometer positioning which provides readability to 0.0001 inch. All waveguide r-f surfaces are plated nickel over silver over copper.
PRICE: From $162.00 to $253.00, depending on waveguide size **AVAILABILITY:** 2 weeks
MFR: DeMornay-Bonardi, 780 S. Arroyo Parkway, Dept. EP, Pasadena, California
SALES OFFICES: See **eem** p. 1259 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 798, 799.

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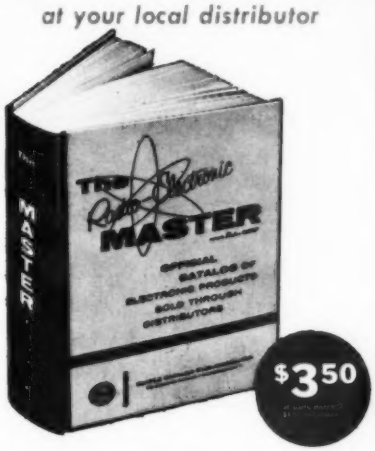
NOW AVAILABLE

at your local distributor



1,551 pages

1960 RADIO-ELECTRONIC MASTER

World's largest buying guide of standard stock TV-Radio-Electronic-Audio products sold thru parts distributors

1551 pages of complete descriptions, specs, illustrations, prices for **175,000** items including all the latest products of **350** manufacturers, systematically arranged in **28** product sections for easy reference

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FREE FROM YOUR DISTRIBUTOR . . . valuable Foreign Tube Interchangeability Guide, or write direct enclosing 25c.

THE RADIO-ELECTRONIC MASTER
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Check 9 Reader Service Card

Electromagnetic & Magnetostrictive

CEC DELAY LINES FILTERS

AUDIO AND HIGH FREQ. MINIATURIZED

Control Electronics Co. Inc. specializes in the design and production of electromagnetic and magnetostrictive delay lines and miniaturized filters. A sample grouping is shown here. Further information is available from our Engineering Dept.

BUILT TO MIL. SPECS. FAST PROTOTYPE SERVICE
1 to 3 WEEKS DELIVERY

Distributed Constant Delay Lines

CEC DISTRIBUTED CONSTANT DELAY LINE FEATURES
- Lowest cost — reliable performance
- Maximum delay to rise time ratios
- Maximum delay per cubic inch
- Delays to 30 μ secs.
- Impedances: 200 to 10,000 Ω
- Bandwidths to 20 mcs
- Linear phase shift

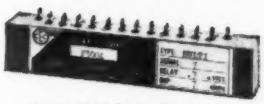
Miniaturized, Electrically or Mechanically Variable Delay Lines

Infinite, incremental or decade variable delay lines available in any range of delays and impedances.

Fixed or Variable Magnetostrictive Delay Lines

Long and Short Delays from 5 μ secs to 5,000 μ secs. Choice of impedances.

Lumped Constant Delay Lines



Multi-tapped Lumped Constants available in many configurations

DELAYS TO 20,000 MICROSECONDS
BANDWIDTHS to 500 MCS
Zo FROM 50 TO 10,000 OHMS

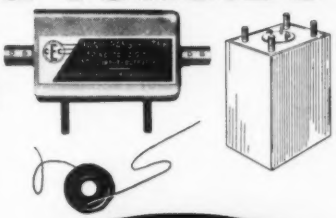
Over 275 standard Lumped Constant Delay Lines available

System Delay Lines

Complete delay and pulse systems designed to your needs.

Audio and High Frequency, miniaturized FILTERS and TOROIDS

Standard and Special Designs to meet customer's unusual requirements.
HIGH, LOW & BANDPASS FILTERS with input and output impedances from 500 ohms to 10,000 ohms, and with cut-off frequencies from 200 cps to 70 kcs, including the 23 standard RDB Telemetering channels.



STANDARD	SPECIALS
High Pass	90° Phase Shift
Low Pass	Null "T"
Band Pass	Ultra Stable
Inter-Stage	Band Suppression
	Constant Delay

SPECIAL FILTERS AND TOROIDS TO YOUR SPECS. QUICK DELIVERY

CONTROL ELECTRONICS CO., INC.
Ten Stepar Place, Huntington Station, New York

NOTE: Data Sheets on request

Check 10 Reader Service Card

MINIATURIZED MICROWAVE COAXIAL ATTENUATORS [*Microlab*]

eem File System Sec. 3400

Operate From 4000 To 12,000 MC—Values Of 3, 6, 10 And 20 DB

Claimed to be shorter and lighter than any previously available, this new line of Miniaturized Coaxial Attenuators (AC Series) operates from 4000 to 12,000 megacycles.

The units are constructed as coaxial lines with lossy center conductors. This method results in a unit with VSWR and attenuation characteristics far superior at microwave frequencies to those which can be obtained with lumped constant techniques, maker says. The variation of attenuation vs. frequency is negligible across the band.

These attenuators are supplied with N, BNC, TNC, C or HN connectors at values of 3, 6, 10, and 20 db. Other values can be supplied with minimum delay. Maximum input power is 2 watts average, 3 kilowatts peak.

The attenuators are ruggedly constructed and designed to meet the environmental conditions of MIL-E-5272B and other similar specifications. Their overall length is approximately 2.6 inches for the lower values, increasing to 3.5 inches.

PRICE: $30.00 to $45.00 depending on attenuation value and connector type **AVAILABILITY:** Stock
MFR: Microlab, 570 W. Mt. Pleasant Ave., Dept EP, Livingston, N. J.
SALES OFFICES: See **eem** p. 1328 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 817

Check 56 Reader Service Card 2/60

VSWR AMPLIFIER [*Narda Microwave Corporation*]

eem File System Sec. 3400

Transistorized—Battery Operated

An improved version of this manufacturer's VSWR Amplifier has just been introduced. Designated as Model 441B, the unit is transistorized, battery-operated, and has built-in provision to show the state of battery charge. The amplifier's own meter is used to indicate this at a flick of a switch.

The most compact unit on the market, the Model 441B is supplied with nickel-cadmium batteries, providing complete independence from line voltage fluctuations. Batteries recharge automatically when the unit is plugged in.

A special protective circuit permits switching and connect-disconnect with no danger of bolometer burnout. Provision is made for both crystals and high and low current bolometers. An expanded scale offers the highest gain of all VSWR amplifiers on the market, and provides the same sensitivity at both expanded and normal stages (0.1 microvolt at 200 ohms for full scale).

Attenuator accuracy is ±0.1 db per step; ±0.2 db maximum cumulative. Meter linearity is 1% of full scale.

PRICE: $225.00 **AVAILABILITY:** From stock
MFR: Narda Microwave Corporation, 118-160 Herricks Road, Dept EP. Mineola, New York
SALES OFFICES: See **eem** p. 1334 (1950-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 820-823

Check 57 Reader Service Card 2/60

MICROWAVE RADIATION DETECTOR [*Radar Measurements Corp.*]

eem File System Sec. 3400

For Personnel Protection Against VHF, UHF, Microwave Energy From Radar Transmitters

Specifically designed to detect VHF, UHF, and microwave energy radiating from high-power radar transmitting tubes, and antennas, this Model 1200 Densiometer instantly indicates any radiation present above or below the presently safe energy level of 10 mw/cm² on its red-green coded direct reading meter.

The compact design of the Densiometer permits operation with one hand, leaving other hand free. Two simple controls permit operation by non-technical personnel. A push-button switch provides a battery check in the off position. Accidental use of this switch during a measurement does not interfere with the reading. Density range of the instrument is 0 to 20 mw/cm².

Frequencies covered are: 200-225 mc; 400-450 mc; 2600-3300 mc; 5000-5900 mc, and 8500-10,000 mc. One UHF/VHF antenna and three horns covering these ranges are supplied with the instrument, as is a metal carrying case for the entire set.

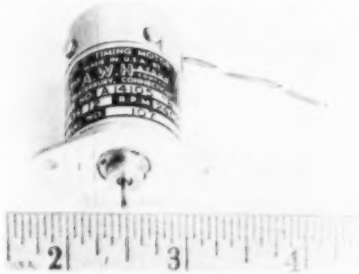
Antennas at other increments within the S, C, X and UHF, VHF bands are also available.

PRICE: $910.00 **AVAILABILITY:** 10 days
MFR: Radar Measurements Corp., 190 Duffy Ave., Dept EP, Hicksville, N. Y.
SALES OFFICES: See **eem** p. 1355 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 834

Check 58 Reader Service Card 2/60

SUBMINIATURE D-C MOTORS [*A. W. Haydon Company*]

eem File System Sec. 3500



High Torque, Low Rotor Inertia, Reversible

Characteristics of the new line of subminiature, reversible, d-c motors (Series 14100) include extreme compactness, high torque, low rotor inertia, and high efficiency.

Measuring less than 1 inch in diameter, 1⅜ inches long, and weighing only two ounces, a motor of this type was used to drive a miniature tape recorder in the Vanguard II weather satellite which is expected to remain in orbit for 200 years. In subminiature systems, these units are also recommended for use in repeat cycle timers, time delay relays, tape recorders, printed circuit commutators and as potentiometer drives. They may also be used as low voltage generators.

Owing to an unusual rotor assembly design, speed tolerance of ±10 percent can be maintained at rated voltage. Speed variation due to applied loading or temperature change is kept to a minimum. Standard units are available for operation on voltages from 4.5 to 30 volts dc, and special windings can be supplied for other voltages. Life expectancy is 1000 hours minimum over the temperature range —54°C to 85°C.

PRICE: $30.00 to $60.00 **AVAILABILITY:** 1 month
MFR: A. W. Haydon Company, 232 North Elm Street, Dept EP, Waterbury 20, Conn.
SALES OFFICES: See **eem** p. 1296 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 992, 993

Check 59 Reader Service Card 2/60

SINGLE LENS REFLEX OPTICAL SWITCH [*Presin Company*]

eem File System Sec. 3700

Insensitive To Ambient Light, Shock And Vibration

The unique Opten approach has been applied in this new LS series Single Lens Reflex Optical Switch. The light source, photocell and transistorized amplifier are combined in a single 3⅜" x 2⅜₁₆" x 5⅛" package. A single lens serves for the exit and return of the light beam. A special patented mirror, consisting of many corner reflector elements, returns the beam of light directly back to the light source despite misalignment in excess of 15°. The light beam travels out and back through the same lens to the photocell via a half-silvered mirror.

The LS series offers these advantages; insensitivity to ambient light, shock and vibration, ease of installation and freedom from maintenance, maker states. Wiring is to one side only. Actual mounting problems are minimized by toleration of gross misalignment of the reflector and the head itself.

Focused and parallel beams are available for operation as close as 1" or as far as 80 ft. Objects smaller than .05" diameter can be easily detected.

PRICE: $137.50 **AVAILABILITY:** From stock
MFR: Presin Co., 2014 Broadway, Dept EP, Santa Monica, Calif.
SALES OFFICES: See **eem** p. 1353 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 963

Check 60 Reader Service Card 2/60

Have you a unique problem in electronic design, engineering or procurement? Send it to the Editor of ELECTRONIC PRODUCTS Magazine. Some of our more than 56,000 readers will undoubtedly have a solution.

Here are some typical problems recently received, as well as solutions to problems previously published.

FREE TECHNICAL BOOKS AWARDED FOR OUTSTANDING PROBLEMS & SOLUTIONS

Each month two books will be awarded to ELECTRONIC PRODUCTS Magazine readers—one for the most pertinent problem, the other for the best solution to any problem. The winners, chosen by the Editor, may select their awards from the current catalog of John F. Rider Publisher, Inc. All decisions final; duplicate prizes in case of ties.

(Problem 141)

PRECISION RESISTIVE POTENTIOMETERS

Our problem is to control procurement of precision resistive potentiometers by specification such that upon integration into a predetermined environment a predictable noise level can be obtained along with an optimum noise level life. To be more specific, in a pot exactly meeting the 100 ohm at 1 ma of wiper current requirement of NAS710, is it possible to predict the order and direction of wiper noise change at 1 microampere of wiper current and currents in between? What wiper currents are conducive to optimum noise life? Do answers to the above questions vary widely with regard to wound pots, plastic pots and film pots?

(Problem 142)

HIGH VOLTAGE COAX TRIMMER CAPACITOR

Do you know of a high voltage (greater than 2500 wvdc) coax trimmer capacitor in the tens of micromicrofarad range, with extremely low DQ and stray capacitance? I need a standard product at a low price.

(Problem 143)

SEMICONDUCTOR WAFER THICKNESS INDICATOR

In our production facilities we have need for an electronic thickness measuring and indicating device to measure semiconductor wafers. The device should meet these specs: 1) Contacting or non-contacting; 2) Area of measurement is a point contact on a wafer about .125" square; 3) Points of measurement are on opposing flat side of wafer and/or at the bottom of .010 diam. pits on opposing sides of wafer; 4) Two opposing probes are needed (pits on both sides of wafer); 5) Range of thickness for wafer measurement from .001" to .007". For pit measurement .0001" to .002" with range switching if necessary; 6) Measurements can be either comparative or absolute; 7) Accuracy should be ±.000005"; 8) If contacting device is used, contact pressure on either side of wafer should be less than 6 grams. Our need includes—gage head, transducer, detector, indicator, and a well-filtered d-c output voltage which is proportional to thickness (2V/mil).

SOLUTIONS TO PROBLEMS IN PREVIOUS ISSUES

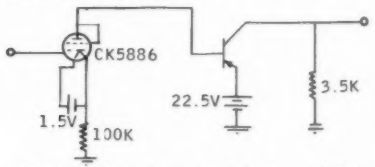
(Problem 135)

TRANSISTOR AMPLIFIER IMPEDANCE MATCH

We are having a problem matching a transistor amplifier to a very high impedance low signal level source. I'm sure some of your Electronic Products readers can crack the following problem:

We'd like to obtain a design for the input stages of a transistor amplifier whose input impedance would match our low level, high impedance (8 megohms) signal source. Our signal level is in the order of 150-250 microvolts thereby forcing this to be a very low level amplifier with very low noise.

SOLUTION B: An extremely high input impedance (max. input current 2 x 10^{-13} amp) can be obtained by using a CK5886 electrometer tube as an input transformer. This tube is small, rugged, requires little filament power, and can receive its plate supply voltage through a transistor. The following circuit is presented as an example of the use of this tube with transistors:

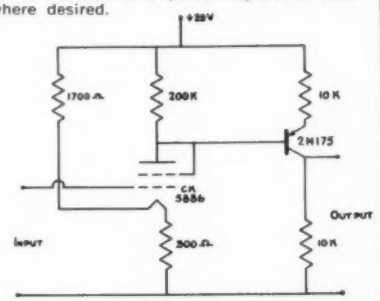


The transistor type depends upon desired gain, frequency range, and temperature characteristics. The noise level and drift are reasonably small and should be suitable for 100 μvolt signals.

Donald A. Norman, Psychological Lab, Univ. of Penna., Philadelphia, Pa.

SOLUTION C: A simple answer to the problem of matching a low level high impedance source to a transistor amplifier requires the use of a hybrid circuit. An electrometer tube (CK-5886) is very well suited for the application since it operates at low voltages, is small in size, has low filament current.

A possible circuit configuration is shown below. A difference amplifier may also be used where desired.



M. Berndt, Midwestern Univ. Research Assoc., Madison, Wisc.

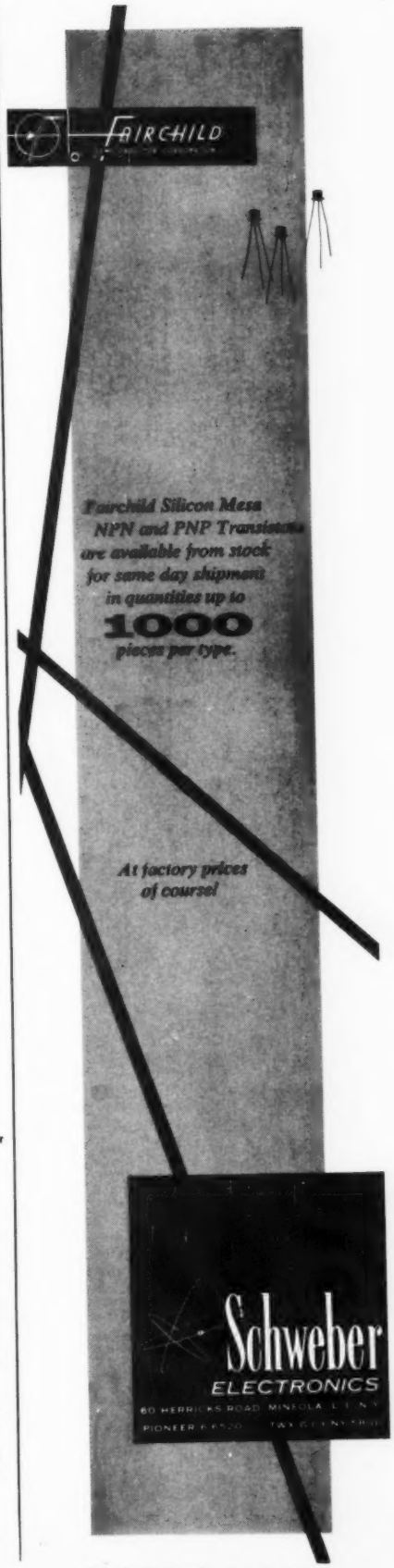
SOLUTION D: An article, "Transistor AC and DC Amplifiers with High Input Impedance", appearing in Mar. 1959 "Semiconductor Products" magazine, was quite helpful to us in a problem somewhat similar. However, we were dealing with a much lower signal level (1 mv) and had to abandon transistors for the present. However, I believe the above problem could be solved, if the procedures and designs outlined in the article are followed.

S. I. Gaytan, Research Physicist Phelps Dodge Corp., Douglas, Arizona

WINNERS OF RYDER BOOK AWARDS FOR JANUARY

Solution to Problem 126: F. B. TERRY, Qual. Control Test Eng., Bendix Aviation, Teterboro, N.J.

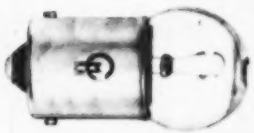
Problem 139: P. HOVER, Proj. Dev. Eng., Ranco Inc., Columbus, Ohio



Check 11 Reader Service Card

5,000 HOUR INDICATOR LAMP [*Chicago Miniature Lamp Works*]

eem File System electronic engineers master Sec. 3900



Developed For TV Channel Indicator Light—G6 Envelope—7.5V At .80 Amps

Because this new 63L Indicator Lamp is designed to provide the exceptionally long life of 5,000 hours, better than four times the life expectancy of lamps currently used for TV Channel Indicators, this unit rarely requires replacement. It produces a saving for the manufacturer as well since it is designed for use without a resistor in the circuit. The precisely located filament aids in concentrating maximum light in the channel indicator window.

The new 63L lamp was engineered to comply with the Underwriters Laboratories request for the use of a 5,000 hour lamp for this function.

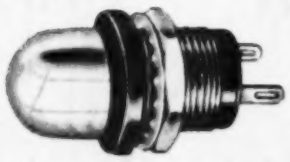
Housed in a G6 bulb the lamp has a single contact bayonet base and operates on 7.5 volts at .80 amperes. Maximum overall height is 1 7/16".

PRICE: 26c list; approximately 9c each in large quantities.
AVAILABILITY: From stock
MFR: Chicago Miniature Lamp Works, 1500 No. Ogden Ave., Dept EP, Chicago 10, Ill.
SALES OFFICES: See **eem** p. 1248 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 855

Check 61 Reader Service Card 2/60

SUBMINIATURE PILOT LIGHT [*Dialight Corporation*]

eem File System electronic engineers master Sec. 3900



Mounts From Front Of Panel—Water-Tight On Face Of Panel

This new Series 101-8430W subminiature pilot light is water-tight on the face of the panel. Watertightness is achieved by means of a flat, 1/32-inch-thick, neoprene gasket on the shank of the lens holder, and a 1/16-inch-thick retained "O" ring seal behind the flange of the mounting bushing.

The pilot lights are compact. Each unit measures 1 1/4 inches in length and mounts in a single 13/32 inch clearance hole. Mounting from the front of the panel facilitates replacement of either the complete unit or the lamp.

The pilot lights are fully insulated; they require no special insulating washers. The socket, lamp, and all connections are insulated from the mounting bushing by means of phenolic material of military specification grade.

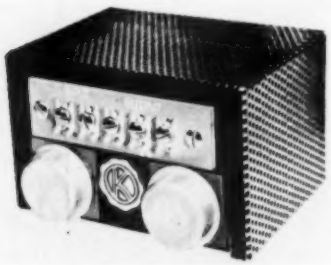
The unit accommodates T-1 3/4 midget-flange-base incandescent lamps of voltages ranging from 1.3 to 28.0 volts. The assemblies meet all applicable military specifications. "All-angle visibility" is afforded by the stovepipe-shaped cap which is available in transparent or translucent finish.

PRICE: On request **AVAILABILITY:** From stock
MFR: Dialight Corporation, 60 Stewart Avenue, Dept. EP, Brooklyn 37, New York
SALES OFFICES: See **eem** p. 1260 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 857-871.

Check 62 Reader Service Card 2/60

TRANSISTORIZED POWER SUPPLIES [*Kupfrian Manufacturing Corp.*]

eem File System electronic engineers master Sec. 4000



Converts Low Voltage DC To High Voltage DC Or AC

Three new transistorized Power Supplies have been added to this manufacturer's standard line.

The units convert 12.6 volts dc to high voltage dc for mobile communications systems, marine navigation equipment, aeronautical instrumentation, or portable electronic apparatus.

The units have a high conversion efficiency—75% efficiency at 70% power output; 85% efficiency at 100% power output. The steady d-c output ripple is 0.4% maximum. Voltage regulation is excellent. The temperature range is from —55°C to 60°C (—67°F to 140°F).

Since the units have no vacuum tubes or moving parts, they are mechanically and electrically quiet, and start instantly. They are shock resistant, are almost maintenance-free, and are unaffected by moisture or vibration.

Approximate over-all dimensions are: 3 3/8" wide by 4 1/8" long by 2 1/2" high; weight is 1.5 pounds. (Model CA-12105-10 is slightly larger.)

PRICE: $57.00 to $59.00
AVAILABILITY: From stock
MFR: Kupfrian Manufacturing Corp., 395 State Street, Dept EP, Binghamton, New York
SALES OFFICES: See **eem** p. 1315 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 596, 903, 1194

Check 63 Reader Service Card 2/60

BANTAM SIZE REGULATED POWER SUPPLY [*Matthew Laboratories*]

eem File System electronic engineers master Sec. 4000

Solid State Unit To Power Solid State Equipment On Bench Or In Rack

Designed to provide maximum power and versatility in a minimum volume, this new Model UVS-100 Bantam Size Variable Voltage Regulated Power Supply has an output of 4 to 36 volts at 500 ma. The device, utilizing only semiconductor components, is regulated by a transistorized circuit containing a Zener diode as reference. Regulation of the unit is better than 1% against line and load variation and ripple is less than 5 mv.

The output, continuously monitored by voltmeter and milliammeter on front panel, is isolated from both input line and chassis ground. A back terminal block, in parallel with the output binding posts, allows rear connections when the supply is mounted in a relay rack or other equipment. Chassis ground connections are provided.

Up to three individual units may be mounted on a 5 1/4" high by 19" wide rack panel available, cut out, from this manufacturer. Housed in a black perforated cabinet with gray front and back panels, the UVS-100 is 4 3/4" wide, 4 1/2" high, 6 1/4" deep.

PRICE: $99.50 **AVAILABILITY:** From stock
MFR: Matthew Laboratories, 3344 Ft. Independence St., Dept EP, New York 63, N. Y.
SALES OFFICES: See **eem** p. 1324 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem.**

Check 64 Reader Service Card 2/60

CONSTANT CURRENT SUPPLY [*Quan-Tech Laboratories*]

eem File System electronic engineers master Sec. 4000

Highly Regulated Current Output 0.5 to 500 Ma Transistorized Circuitry

Extremely useful in applications such as semiconductor testing, diode aging and life test, transistor beta tests, potentiometer and current sensitive relay testing this Model 151 Constant Current Supply meets all requirements where d-c current is the independent variable and a well regulated constant current supply is a necessity. The device can also be used in electolytic work, as a supply for magnets, in strain gage systems, and for many other needs in industrial and lab work.

Circuit of the Model 151 consists fundamentally of a current-sensing resistor, an ammeter, and a current regulator in series with a variable, regulated constant voltage supply.

Output is 0.5 to 500 ma dc in three ranges, 0.5 to 5 ma., 5 to 50 ma., and 50 to 500 ma. Maximum terminal voltage is adjustable from 0.5 to 20 volts dc. Regulation is 0.25%, 0 to 20 volts load; 0.25%, 105-125 volt a-c line. Power input 105-125 volts, 50-60 cycles. Sizes 8 1/4" x 5" x 7 3/4" deep.

PRICE: $275.00 **AVAILABILITY:** 1 week
MFR: Quan-Tech Laboratories, 60 Parsippany Blvd., Dept. EP, Boonton, N. J.
SALES OFFICES: See **eem** p. 1355 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem.**

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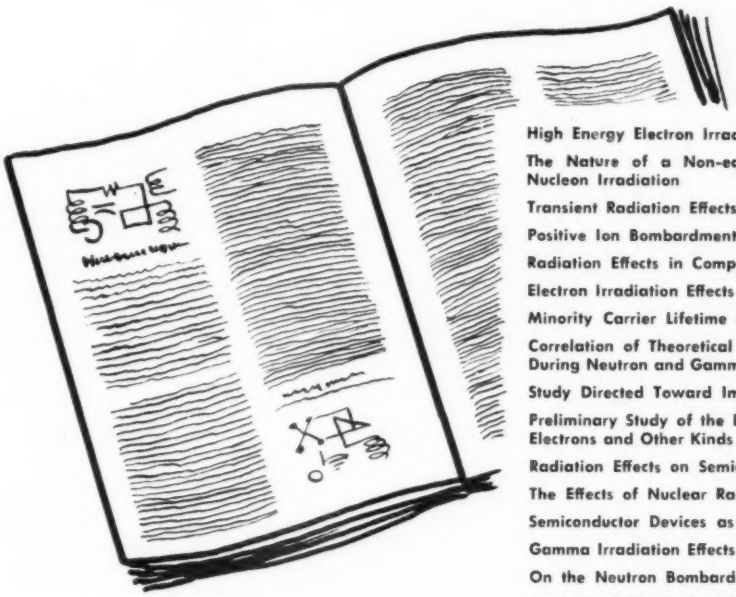
COMING SOON!

BOUND VOLUME

Proceedings of the 2nd Conference on Nuclear Radiation Effects on Semiconductor Devices, Materials and Circuits.

Limited Edition of this Once-A-Year Symposium

AVOID DISAPPOINTMENT — RESERVE YOUR COPIES NOW! Contains the Following 23 Papers, Complete With Illustrations, by the Foremost Authorities in the Field. Don't Miss Out on This Invaluable Information— Only $4.50 a Copy.



High Energy Electron Irradiation of Germanium and Silicon

The Nature of a Non-equilibrium Excess Conductance Induced in Silicon by Nucleon Irradiation

Transient Radiation Effects in Semiconductors

Positive Ion Bombardment of Metals with Radioactive Kr-85

Radiation Effects in Compound Semiconductors

Electron Irradiation Effects in CdS

Minority Carrier Lifetime of Neutron Bombarded Germanium

Correlation of Theoretical and Experimental Behavior of Silicon Junction Diodes During Neutron and Gamma Irradiation

Study Directed Toward Improving the Radiation Tolerance of Silicon Diodes

Preliminary Study of the Effects of Exposure of Electronics Components to 2-Mev Electrons and Other Kinds of Radiation

Radiation Effects on Semiconductors

The Effects of Nuclear Radiation on Some Selected Semiconductor Devices

Semiconductor Devices as Charged Particle Detectors and Energy Spectrometers

Gamma Irradiation Effects on Infrared Detectors

On the Neutron Bombardment Reduction of Transistor Current Gain

Analysis of Simple Rectifying and Magnetic Amplifier Circuits During Irradiation

Transistor Circuit Behavior at Exposures Greater than 10^{15} Fast Neutrons/CM^2

Radiation Resistant Digital Computer Circuitry

The Use of Diffused Junctions in Silicon as Fast Neutron Dosimeters

A Transistor Scaler Circuit For A Megarad Gamma Ray Environment

Problems of Correlating Radiation Environments

The Effect of Intermittent Irradiation of the Magnetic Remanence of a Ferrite

A Brief Resume of Radiation Effects on Semiconductor Materials and Devices

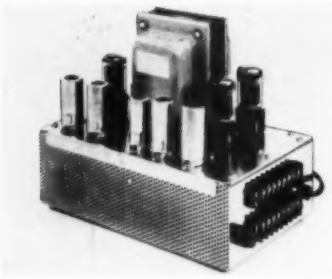
ORDER NOW!

SEND YOUR ORDER TO

SEMICONDUCTOR PRODUCTS, DEPT. MG
300 West 43rd Street
New York 36, N. Y.

DUAL MODULAR D-C POWER SUPPLY [*Trans Electronics, Inc.*]

eem File System electronic engineers master Sec. 4000



Two Outputs Of Positive 300-400 And Negative 300-400 VDC, Or Single 600-800 VDC

This manufacutrer offers another of its modular power supplies in this new Model RS450. The new device provides two outputs of positive 300-400 and negative 300-400 volts; or a single output of 600-800 volts. These ranges are available at currents up to 50 ma.

Both supplies track each other throughout their ranges with single voltage adjustment control located at the top of the chassis.

Model RS450 is available either as a bench module for laboratory use, equipped with line cord, fuse holder and barrier strips; or as a flat plate module for original equipment use.

SPECIFICATIONS:
A-C Filament Outputs ..... 6.3 VCT @ 2 amps; 6.3 VCT @ 1.5 amps; 6.3 VCT @ 1.5 amps.
Current Range ..... 0-50 ma, continuous duty
Ripple & Noise ..... 7 mv peak-to-peak max.
Voltage Range ..... + and — 300 to 400 VDC; or 600 to 800 VDC
Input Voltage: ..... 105-125 VAC, 60-400 cps
PRICE: $135.50; $130.35 as plate module
AVAILABILITY: From stock
MFR: Trans Electronics, Inc., 8349 Canoga Ave., Dept EP, Canoga Park, Calif.
SALES OFFICES: See **eem** p. 1390 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 953

Check 66 Reader Service Card 2/60

HERMETICALLY SEALED OVERLOAD RELAYS [*E. V. Naybor Laboratories, Inc.*]

eem File System electronic engineers master Sec. 4500

50% Smaller Than Units Of Comparable Specs Contact Rating 5 Amperes At 250 VAC

This new series of Hermetically Sealed Overload Relays encompasses single (R3H), double (R6H), and triple (R9H) pole, double throw units. Designed in accordance with MIL spec R5757 the relays feature snap action switches and rugged motor sections to provide excellent resistance to vibration, along with a high degree of dependability. The R3H will operate at power levels of 200 milliwatts (i.e., 1 ampere with a 0.2 ohm coil). Power requirements for the other two units are proportionately higher.

Temperature range for all three units, —55°C to 125°C. Operating shock 50G., vibration 10G to 1,000 cycles; altitude to 70,000 feet.

Coil resistances are available to 10,000 ohms. For 26.5 VDC operation, coil resistance is 425 ohms. Contact rating is 5 amperes at 250 VAC, or 4 amperes at 26.5 VDC. Dimensions of the unit illustrated are 1⅜" x 1$^{27}/_{64}$" x 2" high.

PRICE: R3H; $11.60 (1-9) to $9.30 (M lots)
R6H; $16.60 (1-9) to $13.40 (M lots)
R9H; $21.00 (1-9) to $17.40 (M lots)
AVAILABILITY: 3 to 4 weeks
MFR: E. V. Naybor Labs., Dept. EP, Pt. Washington, N. Y.
SALES OFFICES: See **eem** p. 1336 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 998

Check 67 Reader Service Card 2/60

LINEAR MOTION POTENTIOMETER [*Bourns, Inc.*]

eem File System electronic engineers master Sec. 4700

Designed For Missiles—Noise Free At 40 G's Vibration To 2 KC

Potentiometer Model 157 is a new lightweight, short stroke linear motion potentiometer with unsurpassed vibration characteristics, maker states. Designed primarily for missile applications, it features a self-aligning shaft that permits measurement of linear displacement even when perfect alignment with an actuating member is impossible or where high vibration conditions are encountered. The floating shaft permits free lateral movement of an actuator without side-load effect on the instrument. A unique design eliminates bending loads on the shaft and also accommodates vibratory shaft motion commonly found in hydraulic actuator assemblies.

Specifications are: Standard travel ranges, ½, 1, and 1⅜ inches; Resistances, 1 K to 20K ohms; Power rating, 1.5 watts per inch at 40°C; Operating temperature range, —65° to 374°F; Weight, approximately 1.2 ounces depending on travel.

The Model 157 will operate reliably at 40G up to 2,000 cps with an error less than ½ percent. The unit is available with single or dual pot outputs.

PRICE: On request **AVAILABILITY:** On request
MFR: Bourns, Inc., P.O. Box 2112, Dept. EP, Riverside, California
SALES OFFICES: See **eem** p. 1239 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 1012, 1013

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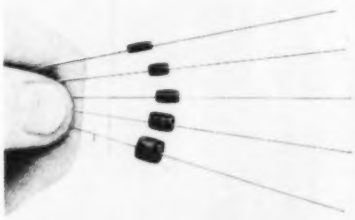
PRECISION WIRE WOUND RESISTORS [*Cinema Engineering Div. Aerovox Corp.*]

eem File System electronic engineers master Sec. 4700



Performance Characteristics Per MIL-R-93B And MIL-R-9444

These microminiature and printed circuit precision wire wound resistors are the newest additions to this manufacturer's product line.

They are as small as ⅛-inch diameter by ⅜-inch long; wattage rating starts at 0.05 watt to ¼ watt at 125 degrees C and derates to zero at 150 degrees C, with accuracies to 0.025 percent.

The new items meet MIL-R-93B and MIL-R-9444 performance characteristics and are available in axial wire terminal types and printed circuit types with dual wire terminals. Standard temperature coefficients are plus and minus 20 ppm, with finer coefficients on special order.

Encapsulation is in epoxy, using the latest techniques and processes. They are aged for long-term stability and reliable performance characteristics.

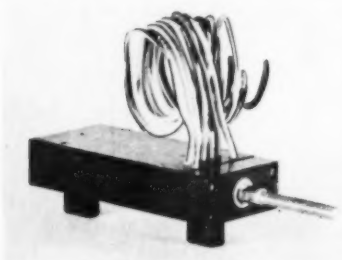
The microminiature resistors are designated as the CE200 series; the printed circuit resistors are designated as the CE400 series.

PRICE: On request **AVAILABILITY:** From stock
MFR: Cinema Engineering, 1100 Chestnut Street, Dept EP, Burbank, California
SALES OFFICES: See **eem** p. 1248 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 1014, 1080

Check 69 Reader Service Card 2/60

LINEAR MOTION POTENTIOMETERS [*Computer Instruments Corporation*]

eem File System electronic engineers master Sec. 4700



Miniature, Dual Element, Infinite Resolution

Model 112, with an over-all size of only ½" by 1⅛", is the new addition to this company's line of precision linear motion potentiometers. The length of the unit is one inch greater than the stroke desired. Strokes are available from ¼" to 3".

Despite its remarkably small size, the Model 112 contains two completely independent elements, either or both of which may be linear or conform to a desired function. Where taps are desired, as many as four per inch per element may be supplied.

This unit offers parameters previously available only in larger units: Linearity, 0.2% ÷ length of stroke; Resistance range, 250 ohms to 125K ohms per inch of stroke; Virtual resolution, 1/35,000 per inch of stroke; Wattage, one watt per inch of stroke; Temperature range, —55°C to 150°C.

The Model 112 is presently being offered with a bottom lug mount and a choice of shaft arrangement; plain end, threaded end, or spherical end bearing.

The life rating of up to 30,000,000 strokes, depending on circuitry, will be of interest to engineers seeking high reliability.

PRICE: Depends on linearity
AVAILABILITY: 30 to 60 days
MFR: Computer Instruments Corporation, 92 Madison Avenue, Dept. EP, Hempstead, L. I., N. Y.
SALES OFFICE: See **eem** p. 1252 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 1015

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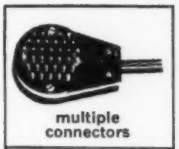
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sockets

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HIRSCHMANN precision made components, a standard of excellence in Europe for more than 30 years, are now available to meet your design, production and replacement needs from the Rye Sound Corp., its 20 sales offices and its national distributor organization. Hirschmann products are standard equipment on such well-known European brands as Norelco, Grundig, Nordmende, Blaupunkt, Lowe, Telefunken, Siemens, Braun, Uher and many others.

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The Hirschmann line consists of miniature type plugs, connectors, and couplings for transistor and other small size applications, as well as standard sizes. The line includes multiple connectors from 2 to 36 poles, round types, flat types, wire mounts, panel mounts, wall mounts, etc. Depending upon the type of plug, they generally feature strain relief, axial and transverse wire connection, flexible sleeves, cord grips, unbreakable construction and shock-proofing.

Included also are spring-loaded and insulated test prods, plus flexible and rigid types, alligator clips, banana plugs, continental type electrical plugs, universal multi-function panel terminals, spade terminals. A complete 52-page catalog with detailed specifications dimensions and applications is available by writing to S. M. Scher

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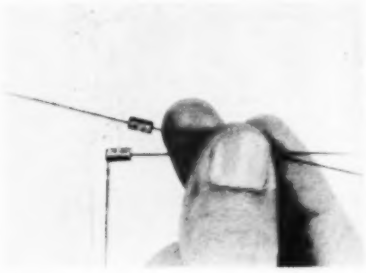
MICROMINIATURE WIRE-WOUND RESISTORS [*Kelvin Electric Company*]

eem File System electronic engineers master Sec. 4700



Only ⅛ Inch Diameter By ¼ Inch Long

Type 301-P precision, noninductive wire-wound resistors measure only ⅛ inch diameter by ¼ inch long, with axial or axial/radial leads. Resistors are encapsulated to withstand extreme humidity, severe mechanical shock, and a temperature range of −65°C to 125°C. The temperature coefficient is ±0.002 percent per degree C. All connections are welded.

"Relaxed winding" techniques produce tension-free windings, practically eliminating resistance drift with age and "shorts" or "opens" frequently caused by thermal shock. All units are temperature-cycled and tested, surpassing military requirements.

Axial Lead Types

Model	Watts	Max. Ohms	Min. Ohms	Dia.	Max. Volts
EP-00	0.05	100 K	10	.080	100
301-P	0.10	100 K	1	.125	100
EP-03	0.10	200 K	10	.080	200

Axial-Radial Lead Types

Model	Watts	Max. Ohms	Min. Ohms	Dia.	Max. Volts
315-P	0.05	100 K	10	.080	100
303-P	0.10	100 K	1	.125	100
162-P	0.10	400 K	1	.125	100
158-P	0.15	700 K	1	.187	100

PRICE: On request **AVAILABILITY:** 2 weeks
MFR: Kelvin Electric Company, 5907 Noble Avenue, Dept EP, Van Nuys, Calif.
SALES OFFICES: See **eem** p. 1312 (1959-60 Ed.)

Check 71 Reader Service Card 2/60

SUBMINIATURE DISC THERMISTOR [*Victory Engineering Corp.*]

eem File System electronic engineers master Sec. 4700

Close Tolerance Unit—Suited For Temperature Compensation or Measurement

The VECO 34D4 Disc Thermistor is now available as a stock item. Maker says the built-in accuracy and reliability of the unit make it ideally suited for temperature compensation or temperature measurement. It falls into their Group IV thermistors.

Thermistors in this group are close tolerance units at any specific temperature and are held to a relatively tight absolute resistance level. The primary and distinguishing features of thermistors in this group are their interchangeability with other units of the group. This is valuable in such applications as multi-station temperature readings from a single meter circuit.

The device is a plain disc thermistor having its R_o matched to a nominal resistance versus temperature curve within ±5%. The following is the test specification:

R_o at 0°C (32°F) = 13,096 ohms ±5%
R_o at 25°C (77°F) = 4,000 ohms ±5%
R_o at 50°C (122°F) = 1,438 ohms ±5%
R_o at 100°C (212°F) = 270 ohms ±5%

PRICE: $4.20 ea.
AVAILABILITY: Approx. 4 weeks
MFR: Victory Engineering Corp., P. O. Box 373, Dept. EP, Union, N. J.
SALES OFFICES: See **eem** p. 1398 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** pp. 1044-1053

Check 72 Reader Service Card 2/60

GERMANIUM PNP SWITCHING TRANSISTOR [*Bendix Semiconductor Products Div.*]

eem File System electronic engineers master Sec. 4800

For Use Mainly In Missiles And Supersonic Aircraft

The 2N1120 is a military-type transistor meeting Specification MIL-T-19500A 68 (SigC). The maximum collector-emmitter voltage rating is 70 vdc, and the maximum collector current rating is 10 amperes. The 2N1120 will readily dissipate 45 watts at a 25°C mounting base temperature. High current switching, audio amplification, small motor and servo drivers are typical applications for this transistor.

Absolute Maximum Ratings:

Vce, Vdc	70
Vcb, Vdc	80
Ic, Adc	10
Pc, W	45
Ib, Adc	1.0
Tj, °C	95

PRICE: $22.50 (1-99), $15.00 (100 plus)
AVAILABILITY: From stock
MFR: Bendix Aviation Corp., Red Bank Division, Dept EP, Long Branch, New Jersey
SALES OFFICES: See **eem** p. 1235 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

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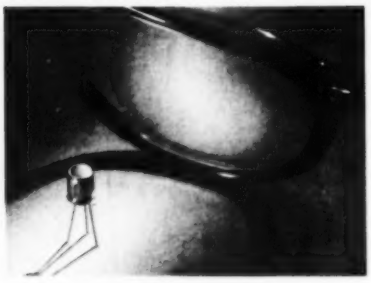
1000 MEGACYCLE TUNNEL DIODE [*G. E. Semiconductor Products Dept.*]

eem File System electronic engineers master Sec. 4800



Minimum Peak/Valley Current Ratio 5:1—Hand Made Samples For Designers

Expected to effect important space and capability improvements in computers, TV sets, communication equipment, nuclear control, satellites and space vehicles this new Tunnel Diode ZJ-56A, is a 1000 megacycle device. Like the transistor, but smaller, the tunnel diode operates on a different principle, however, and offers advantages the transistor lacks. Tunnel diodes achieve higher frequency operation easier than the transistor and are relatively insensitive to temperature changes and nuclear radiation.

Features of the new unit include a minimum peak to valley current ratio of 5:1 (as against 8:1 for GE's first unit), a typical peak point current rating of 1 milliampere, which is held to ±10%, and a typical negative conductance of 0.065 mho.

The tunnel diodes are packaged in the standard TO-18 JEDEC transistor housing (case height 3/16"). The devices are rated for an operating junction temperature of —55°C to 100°C. They have typical peak point voltages of 55 millivolts and typical valley point voltages of 350 millivolts.

PRICE: $60.00 each
AVAILABILITY: Immediately in sample quantities
MFR: GE Co., Semiconductor Products, Dept EP, Electronics Park, Syracuse, N. Y.
OTHER PRODUCTS: See **eem** pp. 974, 975, 1056

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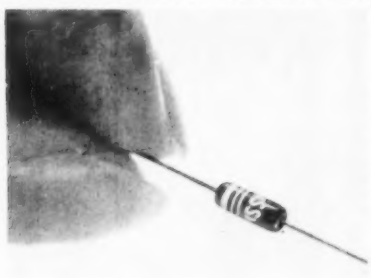
HIGH-CURRENT SILICON SWITCHING DIODES [*Sperry Semiconductor Div.*]

eem File System electronic engineers master Sec. 4800



Fastest Diode—0.3 Microsecond For Computer Switching, Gating, Blocking

Labelled "the 1N920-1N923 series" these High-Current Silicon Switching Diodes newest advance in high-conduction, fast-recovery diodes have met the most severe requirements of high-current pulse circuits for computer switching, pulse clamping, gating, blocking and diode logic circuits. They are said to approach a "universal", "all-purpose" diode —excellent for general high-conduction applications.

Available in four voltages, they effect 0.3 μsecond switching of ½ ampere pulses with peak power dissipation of 800 milliwatts. Designed for high-temperature operation to 175°C, high forward conductance 500 ma at 1 volt maximum drop and low leakage 50 μa.

All units feature a maximum recovery time of 0.3 μseconds to return to 10K ohms when switched from a forward current 2 μsecond pulse of 500 ma to a reverse voltage of —50 volts (—30 V for 1N920), with loop impedance of 1K ohms. Faster switching speeds are obtained at lower currents.

PRICE: $5.35-8.40 (1-99); $4.38-6.87 (100-999)
AVAILABILITY: On request
MFR: Sperry Semiconductor Div., Sperry Rand Corp., Dept EP, So. Norwalk, Conn.
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

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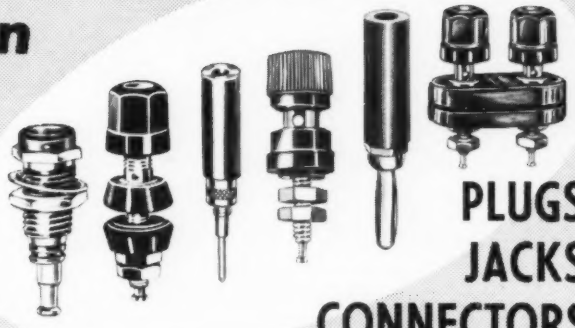

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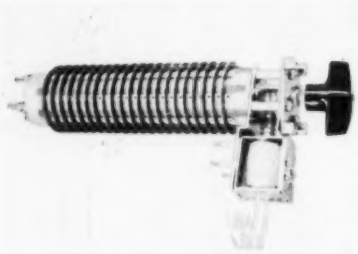
SOLENOID LOCK FOR ROTARY SWITCH [*Electro Switch Corporation*]

eem File System electronic engineers master Sec. 5100



Prevents Unauthorized Or Accidental Change Of Control Setting

This new Solenoid Lock is designed for use where it is important that circuit-control settings be changed only by authorized personnel or in a prescribed sequence. This locking mechanism can be furnished with ESCO Type JR multipole rotary switches. Mechanisms can be provided to lock every position of the rotary switch so that no setting can be changed until the solenoid lock is released; or they can be provided with some positions locked and the rest free for local control.

Release is effected by energizing the solenoid or for fail-safe protection by de-energizing the solenoid.

Coils are available for 12-24-115 volt d-c operation and can be impregnated to meet MIL-T-152. The eight-position switch can be furnished in 5, 10, 15, 20 or 25-section assemblies with a wide variety of contact arrangements. Basic electrical rating is 10 amperes 125 volts ac and switches can be supplied to meet MIL-S-21604.

PRICE: Dependent on requirements
AVAILABILITY: Approximately 60 days
MFR: Electro Switch Corp., Dept EP, Weymouth 88, Mass.
SALES OFFICES: See **eem** p. 1270 (1959-60 Ed.)
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem**

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MINIATURE COAXIAL SWITCH [*Microdot, Inc.*]

eem File System electronic engineers master Sec. 5100

Panel Mount Positive Toggle Action—Highly Efficient R-F Characteristics

This miniaturized Coaxial SPDT Switch is stated to have all the electrical and mechanical features of normal coaxial switches, yet measures only 1.300" long, .600" wide, .650" deep, and weighs 1.25 oz. Designated as Type 90-01 the switch is for 50 ohm cable and is so designed that it can be directly inserted into a miniaturized circuit without adapters.

Positive toggle action assures proper switching action and panel mounting provides easy installation. Mating connectors are available for application at, above, or below 400 Mc.

VSWR is less than 1.2 to 2 kmc and insertion loss is 0.5 db at 2.0 gmc. Voltage rating is 1500 volts maximum (60 cps). Crosstalk is better than 60 db to 2.0 kmc. Characteristic impedance is 50 ohms.

Operative life is 50,000 cycles minimum. Connectors are the maker's S-93. Following variations are available: With unused contact shorted to ground; shields can be switched along with center conductor.

PRICE: Varies with requirements
AVAILABILITY: Four to six weeks
MFR: Microdot Inc., 220 Pasadena Ave., Dept EP, So. Pasadena, Calif.
SALES OFFICES: See **eem** p. 1327 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 571

Check 77 Reader Service Card 2/60

MINIATURE PUSH BUTTON SWITCH [*Transistor Electronics Corp.*]

eem File System electronic engineers master Sec. 5100

For Panel Mount On Instruments, Computers, Data Processors, Control Systems

This new Tec-Lite MBS-Series miniature push button switch matches maker's line of miniature indicators and mounts in ⅜" hole on ⅝" centers on 1/16"-⅜" and ⅝"-¾" panel. Features include momentary contact, minimum bounce contacts with wiping action. Low resistance contacts rated at 120V, 100 MA non-inductive load. Option of normally open, closed or combination contacts. Anodized aluminum body, metal hardware, choice of standard button colors or specific color on special order.

Easy operation, .080" (nominal) with 8.5 ounce pressure (nominal). Available with built-in indicator lite either direct or transistor-driven. Temperature Range: Operating and Storage —40°C to 65°C at 95% humidity maximum. Terminals: Turret lug solder terminals or A-MP series "53" taper pin receptacle. Switch Contacts: Gold plated per MIL-G-14548 Type II, hard plate, .00003" minimum. Pushbutton: Cellulose Acetate Butyrate plastic per L-P-349A. Legends: Up to three standard letters, digits or symbols.

PRICE: $0.95 to $4.10 ea. **AVAILABILITY:** From stock
MFR: Transistor Electronics Corp., 3357 Republic Ave., Dept EP, Minneapolis 26, Minn.
SALES OFFICES: See **eem** p. 1390 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 830

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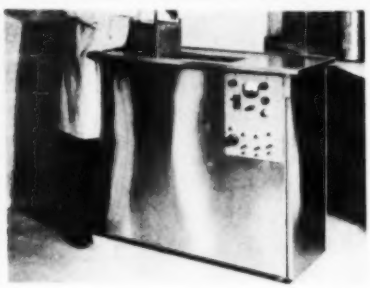
COMPACT ULTRASONIC DEGREASER [*Branson Ultrasonic Corp.*]

eem File System electronic engineers master Sec. 5800



Cleans Electronic Sub-Assemblies, Small Motors Without Dismantling

Designated as Model AC-25 Sonogen (R) this new unit is a self-contained ultrasonic degreaser in a 44"x18"x36" stainless steel cabinet. The device quickly and thoroughly removes metal chips, grease and certain insoluble soils, even from intricate parts. Components such as small motors, electronic sub-assemblies, and bearings can be ultrasonically cleaned without dismantling. After immersion in the ultrasonic degreasing tank, work is spray-rinsed by hand, placed in the vapor zone, then removed from the unit spotlessly clean and dry.

The unit does not use separate generators, cleaning chambers, or rinsing tanks. Only water and 110 volt 60 cps source are needed.

The degreaser has five main parts: a 10x8x8" deep ultrasonic cleaning tank; a boiling sump; a 40,000 cps generator; transducers (in the cleaning tank); and a system to recirculate filtered solvent. As a guard against corrosion, all degreaser parts in contact with solvent are stainless steel or TFE plastic. Variety of fail-safe features protect the unit.

PRICE: $1980.00 **AVAILABILITY:** 30-45 days
MFR. Branson Ultrasonic Corp., 40 Brown House Rd., Dept EP, Stamford, Conn.
SALES OFFICES: See **eem** p. 1239 (1959-60 Ed.)
OTHER PRODUCTS: See **eem** p. 1171

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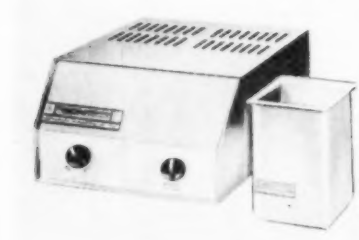
LOW COST ULTRASONIC CLEANER [*Ultrasonic Industries*]

eem File System electronic engineers master Sec. 5800



Half Gallon Capacity — One Control Knob 40-Watt Generator—90,000 CPS Output

The System Forty, a full half-gallon capacity Ultrasonic Cleaner, is claimed to be the lowest priced unit of its kind available. Designed to enable plants operating on a limited budget to utilize the many advantages of ultrasonic cleaning, this Model G-40C1, has a 40-watt generator with an output of 90,000 cps.

Generator cabinet measures 10"x8"x5¾" high and features only one control knob, a simple push-pull activity regulation throttle. The tank is heavy gauge stainless steel deep drawn with rounded corners and is finished with a 4A grade high polish to avoid soil entrapment in crevices or corners to assure surgical cleanliness. Working volume of tank is 5¾" long, 5¼" wide, 4" deep. To operate generator is plugged into any 117 volt 50/60 cycle source. Transducer is integral with tank.

The System Forty will disintegrate more than 50 distinct classes of soils and contaminants from products ranging from highly complex electronic components to jewelry, without disassembly.

PRICE: $99.95 **AVAILABILITY:** From stock
MFR: Ultrasonic Industries, 141 Albertson Ave., Albertson, L. I., N. Y.
OTHER PRODUCTS: Will be cataloged in the forthcoming (1960-61) edition of **eem.**

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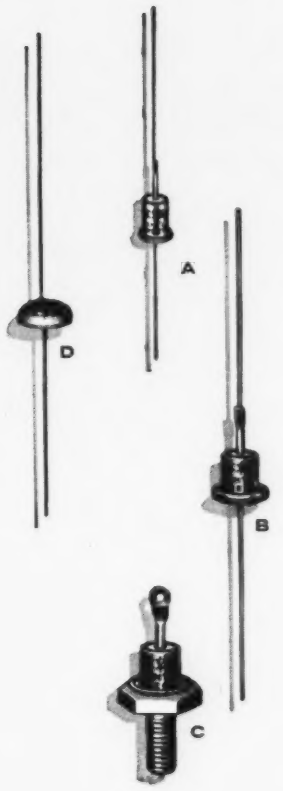

Type Number	Peak Inverse Voltage, Volts	DC Output Current, Ma	Max. DC Reverse Current Ma
A — 300 Ma Rated (at 55°C), 50 to 600 PIV Reverse Current Characteristics at 100°C			
1N1701	50	300	0.4
1N1702	100	300	0.4
1N1703	200	300	0.3
1N1704	300	300	0.3
1N1705	400	300	0.3
1N1706	500	300	0.3
A — 300 Ma Rated (at 55°C), 50 to 600 PIV Reverse Current Characteristics at 150°C			
1N1707	50	500	0.4
1N1708	100	500	0.4
1N1709	200	500	0.3
1N1710	300	500	0.3
1N1711	400	500	0.3
1N1712	500	500	0.3
B — 550 to 750 Ma Rated (at 55°C), 100 to 600 PIV Reverse Current Characteristics at 100°C			
SD-91	100	550	1.0
SD-92	200	550	1.0
SD-93	300	550	1.0
SD-94	400	550	0.80
SD-95	500	550	0.65
SD-91A	100	750	0.5
SD-92A	200	750	0.5
SD-93A	300	750	0.5
SD-94A	400	750	0.4
SD-95A	500	750	0.3
B — 250 Ma Rated (at 150°C), 50 to 600 PIV Reverse Current Characteristics at 150°C			
1N536	50	250	0.4
1N537	100	250	0.4
1N539	300	250	0.3
1N1095	500	250	0.3
1N1096	600	250	0.3

Type Number	Peak Inverse Voltage, Volts	DC Output Current, Ma	Max. DC Reverse Current Ma
B — IAN Types — 250 ma Rated (at 150°C) Reverse Current Characteristics at 150°C			
1N538	200	250	0.3
1N540	400	250	0.3
1N547	600	250	0.3
C — IAN Types — 400 to 1000 Ma Rated (at 150°C) Reverse Current Characteristics at 150°C			
1N253	95	1000	0.001
1N254	190	400	0.001
1N255	380	400	0.0015
C — Power Supply Types, 800 Ma Rated (at 150°C) Reverse Current Characteristics at 25°C			
1N607	50	800	0.025
1N608	100	800	0.025
1N609	150	800	0.025
1N610	200	800	0.025
1N611	300	800	0.025
1N612	400	800	0.025
1N613	500	800	0.025
1N614	600	800	0.025
C — Mag. Amp. Types, 800 Ma Rated (at 150°C) Reverse Current Characteristics at 25°C			
1N607A	50	800	0.001
1N608A	100	800	0.001
1N609A	150	800	0.001
1N610A	200	800	0.001
1N611A	300	800	0.001
1N612A	400	800	0.0015
1N613A	500	800	0.002
1N614A	600	800	0.0025
D — Commercial Types, 200 to 900 Ma (at 70°C) Reverse Current Characteristics at 100°C			
5E4 (Cap. Load)	400	350	0.5
(Res. Load)	400	500	0.5
2E4 (Cap. Load)	400	200	0.5
(Res. Load)	400	300	0.5

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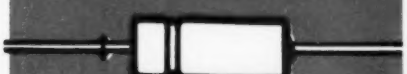

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